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Venomous Snakes of the Middle East

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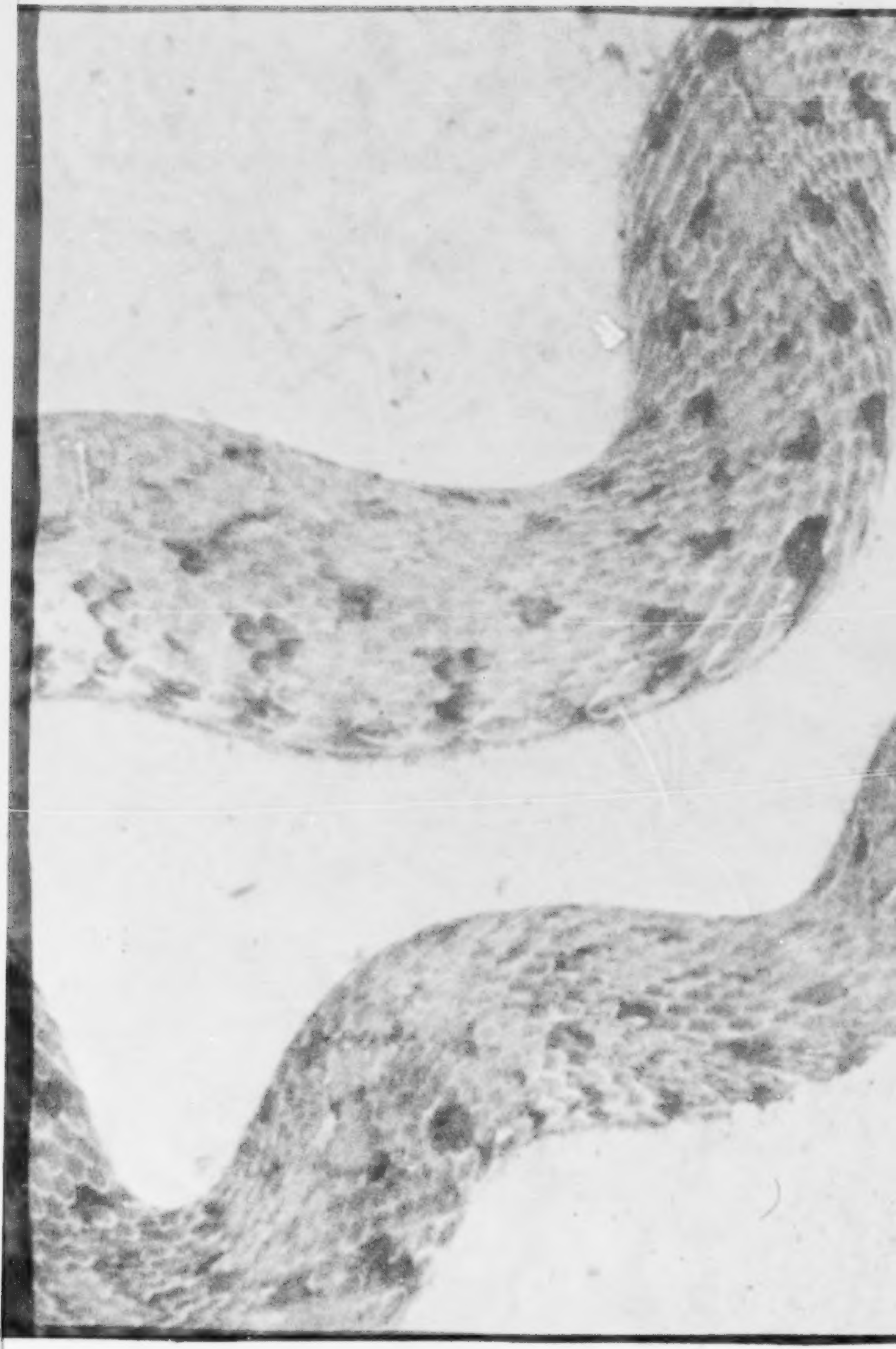

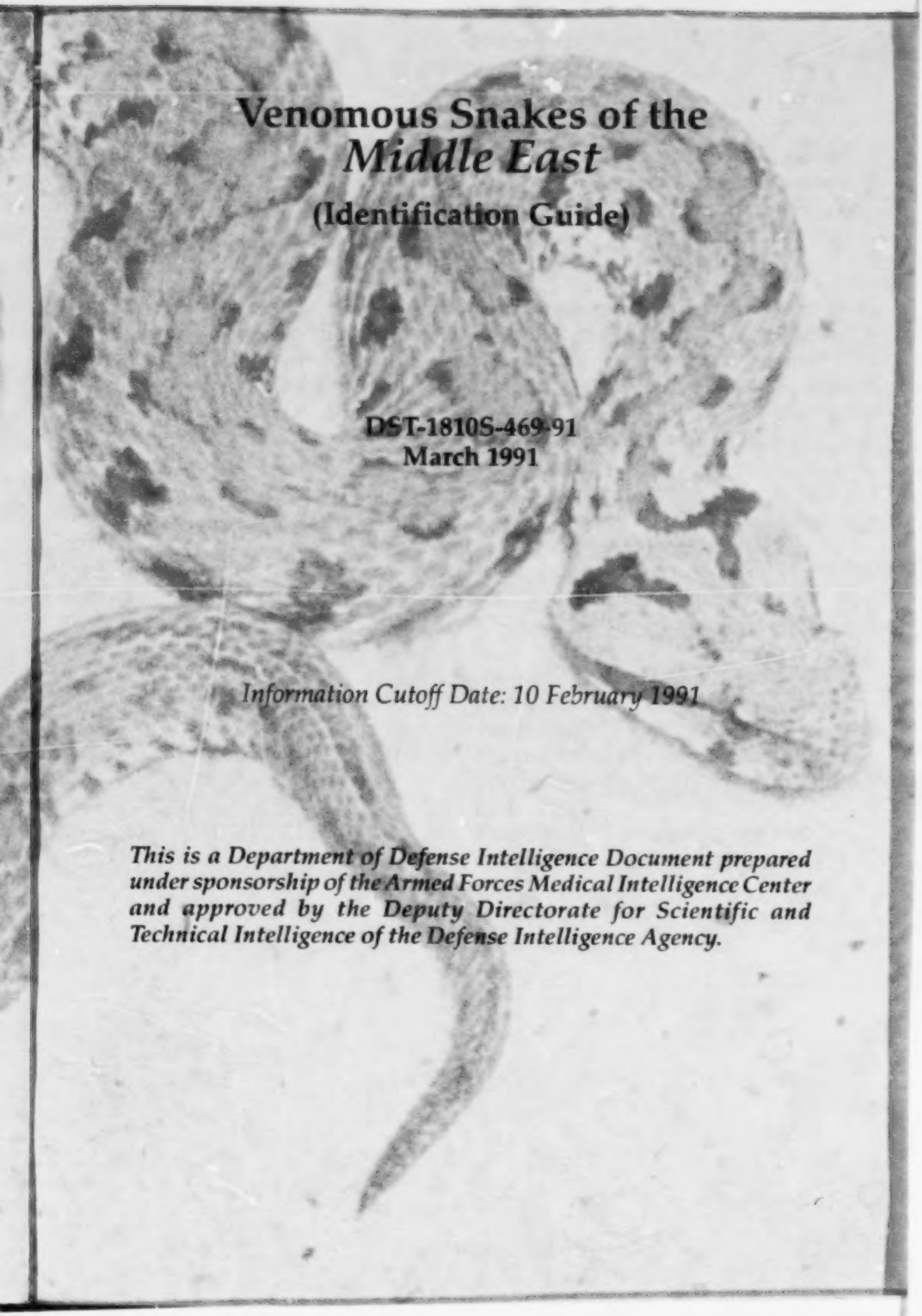

Venomous Snakes of the *Middle East*

(Identification Guide)

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PREFACE

US military personnel may be required to serve in areas of the world where environmental and cultural conditions (for example terrain, availability of prey, low human population density) favor proliferation of venomous snake populations. Under such conditions, the probability of encounters between man and snake is increased.

This identification guide is intended for the commander and his medical and operations officers. It provides specific information needed for planning antivenom support for a mission, and general information needed to maintain troop discipline and morale while operating in snake infested areas. Specific information also is provided on the relative risk/severity of bites by the various species of venomous snakes found in the Middle East and on their identification.

Written and graphic material describing/illustrating the physical characteristics of the snakes found in the Middle East is provided so that reasonably accurate identifications may be made. In addition, each species of snake is classified according to a category of risk based upon peacetime indigenous factors. (Disturbances and disruptions of snakes' habitats resulting from troop movements in time of hostilities may increase the frequency of encounters). These categories are:

I	MAJOR RISK	Frequency of envenomation high; venom highly toxic.
II	MODERATE RISK	Frequency of envenomation moderate; venom may be highly toxic to mildly toxic.
III	MINOR RISK	Frequency of envenomation low; venom may be moderately toxic to mildly toxic.
IV	LITTLE RISK	Frequency of envenomation low; venom only slightly toxic.

The geographic areas where the snakes presented in this identification guide may be encountered include:

Egypt
Lebanon
Jordan
Iraq
Afghanistan
Kuwait
Oman
Bahrain
Saudi Arabia
The Gulf of Aden
The Gulf of Oman
Syria
Israel
Cyprus
Iran
Pakistan
Qatar
Yemen
United Arab Emirates
Turkey
The Arabian Sea
The Persian Gulf

Request that any amplification of subject matter, constructive criticism, comments, or suggested changes be forwarded to Director, Armed Forces Medical Intelligence Center, Building 1607, Fort Detrick, Frederick, MD 21702-5004.

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Section I.
Introduction

SECTION I. INTRODUCTION

General Information

There are 46 species of venomous snakes in the Middle East, 2 in the family *Atractaspidae*, 22 in the family *Viperidae*, 3 in the family *Crotalidae*, 6 in the family *Elapidae*, and 13 in the family *Hydrophidae* (Table I). They occur in habitats ranging from mountains to grasslands, to desert, and are widely distributed. Vast sections of the countries comprising this area of the world are unsuitable for human habitation, but are environments to which the snakes have adapted exceedingly well.

Although snakes and man generally try to avoid one another and contact is infrequent, encounters do occur. Venomous snakes bite and inject venom (envenomate) for only two reasons to obtain prey for food and to defend themselves. Man is not a natural or chosen prey for any snake, but his actions may well threaten the snake, which may respond by defending itself and using its venom as protection.

However remote, the possibility exists that some personnel will be bitten, and some envenomated (not all bites result in envenomation). This may occur despite precautions and knowledge of the risk, or may result from ignorance or from foolhardiness concerning the danger.

How to Lessen the Probability of Snakebite

Avoiding snakebite is much simpler than treating it, therefore it is extremely important that personnel be informed of the presence of snakes, their habits, their likely habitats, and common-sense precautions for lessening the likelihood of being bitten if encounters do occur. Some do's and do not's when operating in areas where snakes are present include:

- Do eliminate garbage and litter from areas frequented by humans; garbage attracts rodents and they, in turn, attract snakes.
- Do avoid sleeping on the ground to the extent possible.
- Do dress properly in snake-infested areas. Most bites occur on the foot or ankle, and combat boots will deflect bites by small and medium-sized snakes. This is particularly important during evening and night hours, when the ground cannot be clearly seen. If clothing and shoes are left on the ground at night, they should be shaken well before being put on in the morning.
- Do be aware of snakes' natural hiding places, or places where they may

Table I. Quick-Reference Guide to the Geographic Distribution of Venomous Snakes in the Middle East

	Cyprus	Turkey	Iran	Afghanistan	Pakistan	Lebanon	Syria	Iraq	Kuwait	Egypt	Israel	Jordan	Saudi Arabia	Yemen	Oman	U.A.E.	Qatar	Bahrain	Gulf of Aden	Arabian Sea	Gulf of Oman	Persian Gulf
ATRACTASPIDAE																						
Atractaspis engaddensis										K	K	P	P									
Atractaspis microlepidota													K	K								
VIPERIDAE																						
Bitis arietans						R	R	R			R	R	K	K	K							
Cerastes cerastes			K					K		K	K	K	K	K	K	K	K	P				
Cerastes vipera						R				K	K											
Echis carinatus		K	K	K	K			K		K			K	K	K	K						
Echis coloratus										K	K	K	K	K								
E. carinatus multisquamatus			K	K	K																	
Echis pyramidium										K			K									
Eristocophis macmahoni			K	K	K																	
Pseudocerastes persicus			K	K	K		R	K		K	K	K	K		K	K						
Vipera albicornuta			K																			
Vipera ammodytes		K					K															
Vipera barani		K																				
Vipera bornmuelleri						K	K				K	R										
Vipera bulgardaghica		K																				
Vipera kaznakovi	R	K	K																			
Vipera latifii			K																			
Vipera lebetina	K	K	K	K	K	K	K	K		R	R	R										
Vipera palaestinae						K	K				K	K										
Vipera raddei		K	K																			
Vipera russelli					K																	
Vipera ursinii		P	K																			
Vipera wagneri			K																			
Vipera xanthina	P	K																				
CROTALIDAE																						
Agkistrodon spp.			K	K	K																	
ELAPIDAE																						
Bungarus caeruleus					K																	
Naja haje										K			K	K	K							
Naja mossambica										K												
Naja naja				K	K																	
Naja oxiana			K	K	K																	
Naja nigricollis										K												
Walterinnesia aegyptia			K				K	K		K	K	K										
HYDROPHIDAE																						
Astrotia stokesi																				K	K	
Enhydrina schistosa																				K	K	K
Hydrophis cyanocinctus																				K	K	K
Hydrophis gracilis																				K	K	K
Hydrophis cantoris																				K		
Hydrophis lapemoides																				K	K	K
Hydrophis ornatus																				K	K	K
Hydrophis caerulescens																				K		
Hydrophis mamillaris																				K		
Lapemis curtus																				K	K	K
Pelamis platurus																			P	K	K	K
Praescutata viperina																			R	K	K	K

For specific distribution areas, see map provided with each snake description.

K= Known Location P= Probable Location R= Reported or Doubtful be difficult to see, and approach them with caution. Such places include: rocky areas and piles of debris (empty containers of any type serve as warm hiding places for snakes at night); trees and bushes, which may conceal arboreal snakes in search of food; cool, covered areas where snakes may seek protection from the direct rays and heat of the sun; loose sand, where some desert snakes burrow, or cover portions of their body by day, and from which they emerge at night in search of prey (at which time the greatest probability of encounter exits).

- Do be especially cautious when crawling through areas covered with vegetation or dry grass, in sandy regions, or on rocky slopes, especially during the evening and at night. A snakebite in the upper portion of the body (face, neck, shoulders, chest, or back) is more dangerous than a bite in the area of the feet or hands.
- Do not sit on piles of stones, piles of boards, or on discarded cans or boxes during breaks.
- Do not dig in concealed places with your bare hands.
- Do not move stones, bricks, concrete blocks, or logs with your bare hands. Instead, use a long object (board, shovel, or pole).
- Do not go out of your way to kill a snake. Many bites are the result of humans attempting to kill snakes without knowing anything of their habits or habitats.
- Do not handle live or dead snakes, particularly recently killed venomous snakes. Especially foolish is touching the teeth or fangs of a dead snake, because the venom retains its potency for quite some time after the snake's death.
- Do use a stick, a bag, or other container when transporting a dead snake which is to be identified.
- Do not panic if faced with, or bitten by, a poisonous snake.

What To Do If Snakebite Occurs

Snakebite victims will not die immediately. Even massive envenomation by most species of poisonous snakes can be successfully treated 1 to 2 hours later (unless intravascular envenomation has occurred). Symptoms of snakebite may include bleeding, pain and burning, swelling, and vomiting. Steps to be taken immediately after snakebite occurs include:

- *Identify the snake.* Unless you are an expert, do this by killing it, ideally without destroying the head. Cut the snake's head off or shoot it behind the head. Do not handle the head, because reflex muscle action may cause biting and envenomation. Evacuate the dead snake (head and body) along with the victim.

- *Keep the Victim Calm.* This will keep heartbeat and blood pressure at a minimum, and slow absorption and spread of the venom. A cool, comfortable place further reduces anxiety.
- *Inspect the Bite Site .* Look for fang marks. One or two deep puncture wounds 10 to 12 mm apart may be apparent. Other superficial tooth marks in a horseshoe pattern may be visible. Absence of fang marks does not mean the victim was not bitten or that the snake was not venomous. There also are cases of snakebites, with fang marks, but no apparent envenomation, commonly referred to as dry bites. There are no clear explanations for this: the snake for some reason may not envenomate, the victim may pull away before venom is introduced, or the snake's venom supply may be depleted. It has been estimated that approximately 30 percent of viper bites and 50 percent of elapid bites are dry.
- *Try to Determine the Character of the Strike .* The character of the strike can affect the severity of envenomation by limiting the amount of venom actually delivered. A bite which is only a glancing or scratch-like bite, or one delivered through several layers of clothing (and thus penetrating less deeply into the tissue), or one which is directly over a bone, will often result in a less severe envenomation than would otherwise have occurred.
- *Record Symptoms.* Sometimes the snake cannot be killed, or even seen after a snakebite. If there is any indication of envenomation, begin recording the appearance and progress of symptoms in as much detail as possible. Such records may be of use to medical personnel in determining which antivenom to use. If discoloration (ecchymosis) is present, mark the area on the skin as an index for recording the progression of swelling.
- *Arrange for Evacuation.* Do this as soon as the situation will allow. In a medical facility equipped to maintain stable body functions and with antivenom available, no one need die of snakebite.

Types of Venom

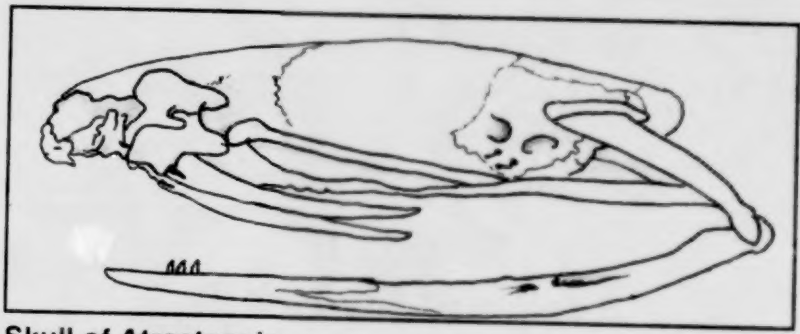
The venom of a given species of snake is a complex mixture of nontoxic but physiologically active materials and toxins. There are three categories of toxins. Neurotoxins affect the nervous system usually by blocking nerve transmission. They have multiple effects, but the immediate risk is their effect on muscle action and coordination, particularly to the diaphragm. Hemotoxins affect the circulatory system in various ways. They may potentiate or interfere with blood clotting and/or cause hemolysis (massive breakdown of blood cells). These actions have many serious secondary results; however, the primary initial danger posed by hemotoxins is their ability to allow leakage of fluid from the blood into the tissue causing edema (localized or generalized swelling) with consequent circulatory collapse (a precipitous loss of blood pressure). This may result in failure of effective heart function. Necrotoxins and nontoxic enzymes capable of destroying tissues can interfere with local blood flow and salt balance in a region of the body near the bite. If this destruction is not neutralized, cell and tissue death will continue.

All snake venoms are complex mixtures of varying amounts of these active materials; thus their symptoms of envenomation will be complex. However, the primary effects of envenomation by the more dangerous snakes are known. Hence, symptoms can be anticipated to a great degree if the snake can be identified.

A Word About Antivenoms

Information on administration of antivenoms to, and subsequent supportive medical treatment of, snakebite victims is beyond the scope of this field manual. However, antivenoms known to be effective, or possibly effective, against the snakes presented in this manual appear in Appendix A. The names and addresses of the producers/distributors of these antivenoms appear in Appendix B. Because manufacturers sometimes discontinue production of certain antivenoms, they should be contacted prior to anticipated need regarding availability. Selected venom LD50s in humans are listed in Appendix C.

Section II.
Snakes of the Family *Atractaspidae*



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Skull of *Atractaspis*

SECTION II. SNAKES OF THE FAMILY ATRACTASPIDAE

Atractapis spp.

RISK CATEGORY II	(Moderate risk). Frequency of envenomation moderate; venom may be highly toxic.
Common names —	(*Atractaspis microlepidota*) Arabian mole viper, burrowing adder, burrowing viper, mole viper, northern mole viper,(*Atractaspis engaddensis*) Black viper, burrowing adder, burrowing viper, mole viper, oasis mole viper, Palestinian mole viper, "sip on shahor" (in Hebrew)
Subspecies —	*Atractaspis microlepidota andersoni* is only subspecies of *A. microlepidota* native to southwest Asia. *A. engaddensis* has no subspecies.

Distribution/habitat — *Atractaspis microlepidota:* Yemen and southwestern Saudi Arabia (throughout provinces of Asir and Qizan). In northern Yemen, probably more abundant in mountainous interior at elevations between 3,000 and 4,500 meters; southern Yemen, occurs in vicinities of Aden and the Wadi Hadramaut. *Atractaspis engaddensis:* the Sinai Peninsula of Egypt, southern Israel, probably in adjacent areas of Jordan and Saudi Arabia. In the Sinai, found along entire eastern shore of Gulf of Aqaba; may occur in central and southern parts of peninsula's interior. In Israel, found mainly in Negev Desert and Arava Plain, but range extends northward along Dead Sea as far north as Gilboa. Probable range in Jordan includes southwestern regions of country, lower Jordan Valley, eastern shores of Dead Sea, desert regions east of Sinai and the Negev. Inhabits relatively moist places near oases, grazing lands, and cultivated areas. Few found in drier regions of deserts. Snake digs burrows with two chambers, an upper "basking chamber" under rocks, concrete slabs, logs, or planks, a lower chamber about 0.3 meters deeper underground.

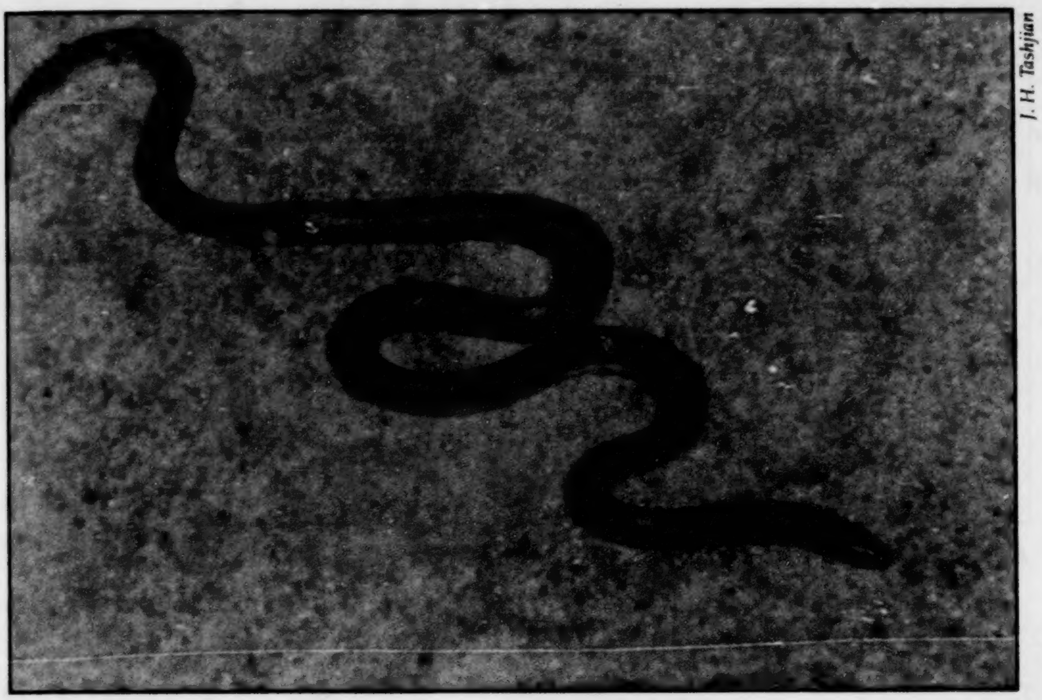
Identification — Moderate size. Average length, *Atractaspis microlepidota,* 0.5 to 0.6 meters; *Atractaspis engaddensis,* some may exceed 1.0 meter. Bodies of smaller snakes short, cylindrical; larger specimens stouter. Head short, narrow (no broader than body), conical. Eyes very small, pupils round. Snout pointed, broad, flattened. Lower jaw underslung; fangs can be extended while mouth closed. Tail short, pointed at end. Dorsal scales smooth, lack keels and apical pits; generally uniformly black, but can be dark brown or blackish with bluish iridescence. Underside may be dark (like rest of snake) or lighter brown. Ventral plates extend full width of belly. *Atractaspis engaddensis* and *Atractaspis microlepidota* usually can be differentiated by their actual location.

Behavior — Nocturnal. Stays primarily underground, has poor eyesight. Usually rests in "basking chamber" in daytime, emerges at dusk to hunt. Generally preys on hard-shelled insects, small rodents, lizards, other snakes. During rainy periods, burrows may flood and snake probably will become more active. Normally not aggressive, but easily excitable, quick to bite. If cover of "basking chamber" overturned, probably will flee into lower chamber; if sheltering object merely disturbed, snake is likely to bite. When striking, snake's head may dart forward above site of bite then come down in a stabbing motion. Snake more likely to curl into a spiral, strike quickly sideways. Many victims are bitten with only one fang. When biting, snake may hold on to victim with neck curled around bitten limb, which may pump additional venom into wound. Snake is small, slender, and can erect fangs without opening mouth, therefore it can strike in confined spaces (e.g., inside narrow burrow tunnels). Because of small head, is often mistaken for a nonpoisonous snake. Snake cannot be held safely except with forceps or tongs, because of small head, long fangs, flexible neck, and ability to bite with one fang while jaws are nearly closed.

Risk — Although experts disagree about toxicity, *Atractaspis* spp. venoms generally believed to be highly toxic; behavior of *Atractaspis microlepidota* unpredictable. Frequency of encounters generally low.

Clinical symptoms — *Atractaspis* spp. venoms are hemorrhagic with necrotic components. Venom is not hemolytic. Bite victims normally experience pain at bite site, followed by paresthesia, local swelling, redness. Mild necrosis around bite site often occurs within 24 hours. Victims may experience nausea, vomiting, abdominal pain, sweating. Victims of severe *Atractaspis* envenomation may experience vomiting, fever, hematuria. Other symptoms (which occur rarely) may include profuse salivation, dysphagia, deafness, loss of ocular accommodation, unconsciousness, dyspnea. These symptoms generally are short-lived, seldom severe. Possible complications include impaired liver functioning, gangrene. Death, when it occurs, normally is soon after envenomation, and results from respiratory paralysis.

ANTIVENOMS: None available.



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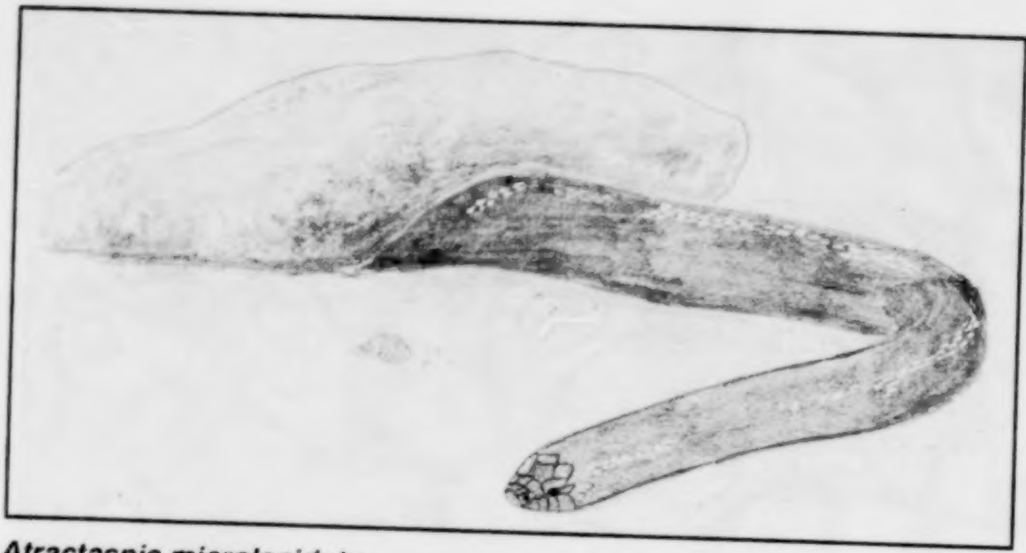
Atractaspis microlepidota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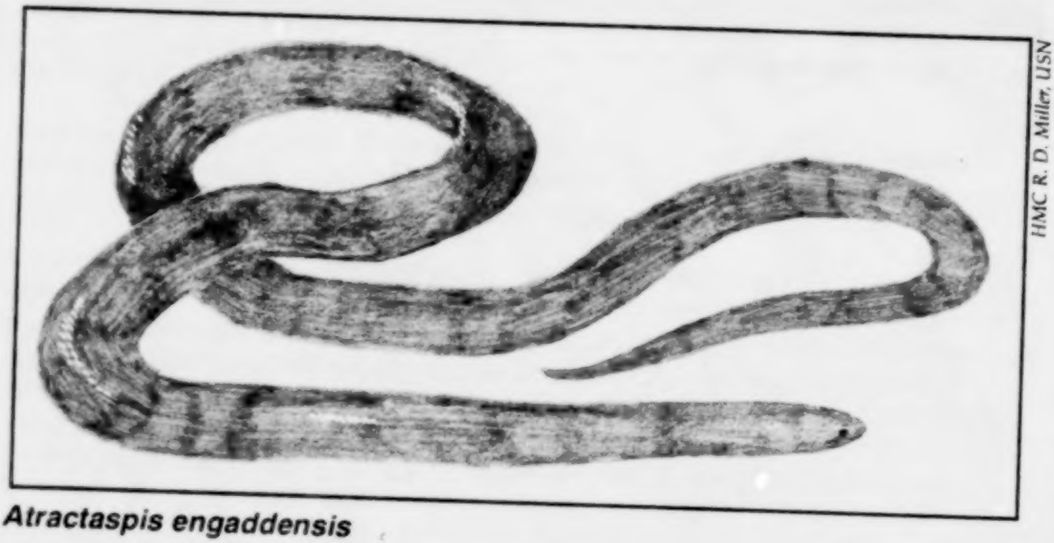
Atractaspis microlepidota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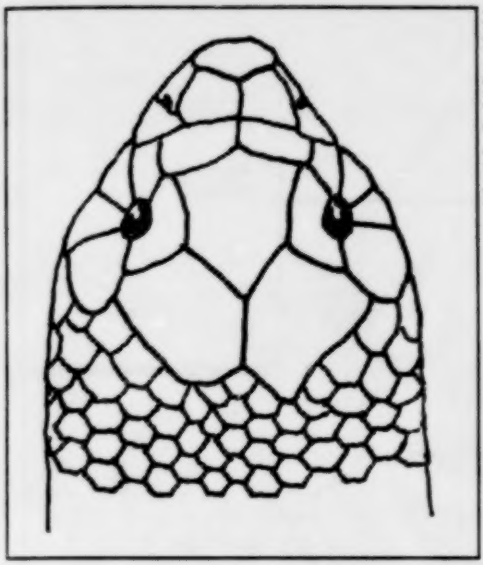
Atractaspis engaddensis



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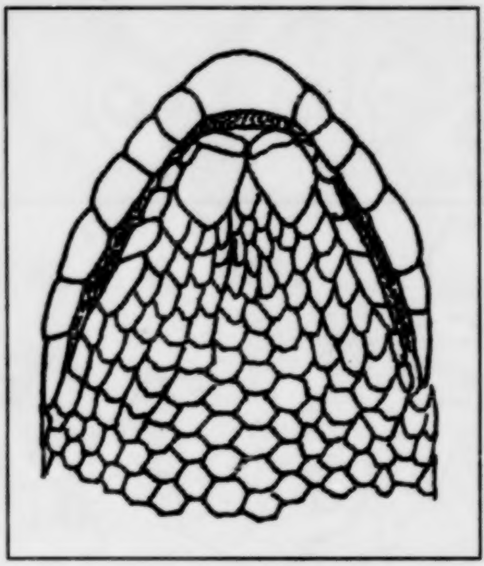
Atractaspis microlepidota andersoni; head, dorsal view



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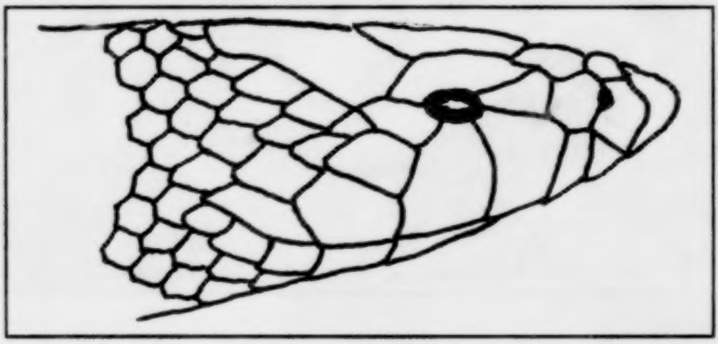
Atractaspis microlepidota andersoni; head, ventral view



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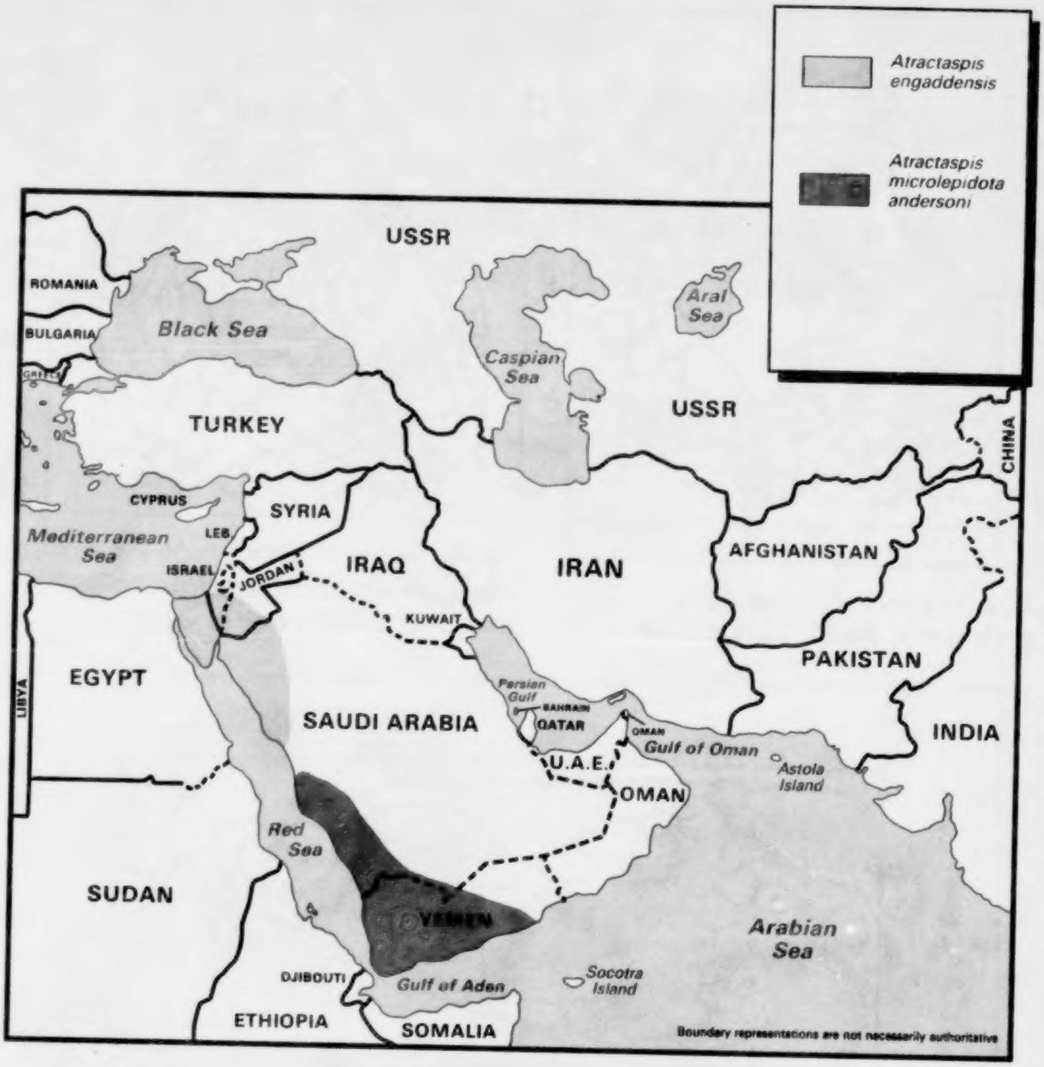
Atractaspis microlepidota andersoni; head, lateral view



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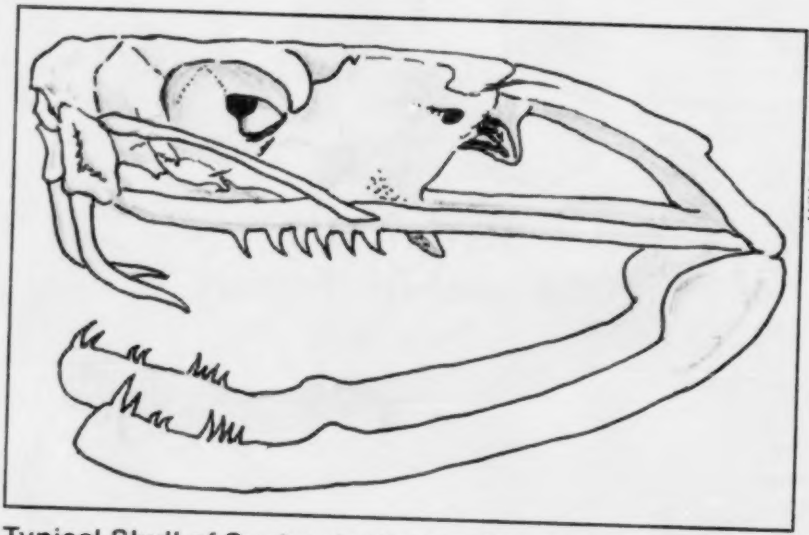
Section III.
Snakes of the Family *Viperidae*



HCM R.D. Miller, USN

Typical Skull of Snakes in the Families *Viperidae* and *Crotalidae*

SECTION III. SNAKES OF THE FAMILY VIPERIDAE

Bitis arietans (also known as *Bitis lachesis*)

RISK CATEGORY II	(Moderate risk). Frequency of envenomation moderate; venom highly toxic.
Common name —	Puff adder
Subspecies —	None in southwest Asia.

Distribution/habitat — Occurs on Arabian peninsula throughout southwest Arabian mountain chain from southwest Saudi Arabia (as far north as Ta'if), in Yemen, and in Oman (Zufar Mountains only). Normal habitat grassland and scrub brush at elevations ranging from 200 to 3,000 meters. Avoids unusually dry or wet areas. Often found near human habitation, agricultural areas.

Identification — Very heavy-bodied; snake average length 0.9 meters (maximum recorded length 1.5 meters). Head large, broad, triangular, distinct from neck, with blunt snout. Fangs may reach length of 12 to 18 mm depending on size of snake. Pupil of eye vertical. Girth ranges from 20 to 30 cm. Tail short in males, very short in females. Snake's pattern and color quite definite, often blending with the environment. Dorsal coloration variable, ranging from yellow to yellow-brown, reddish-brown or gray, patterned with black or brown pale-edged chevrons running length of body towards tail, where pattern changes to dark and light crossbands. Ventral coloration yellow or white with black blotches.

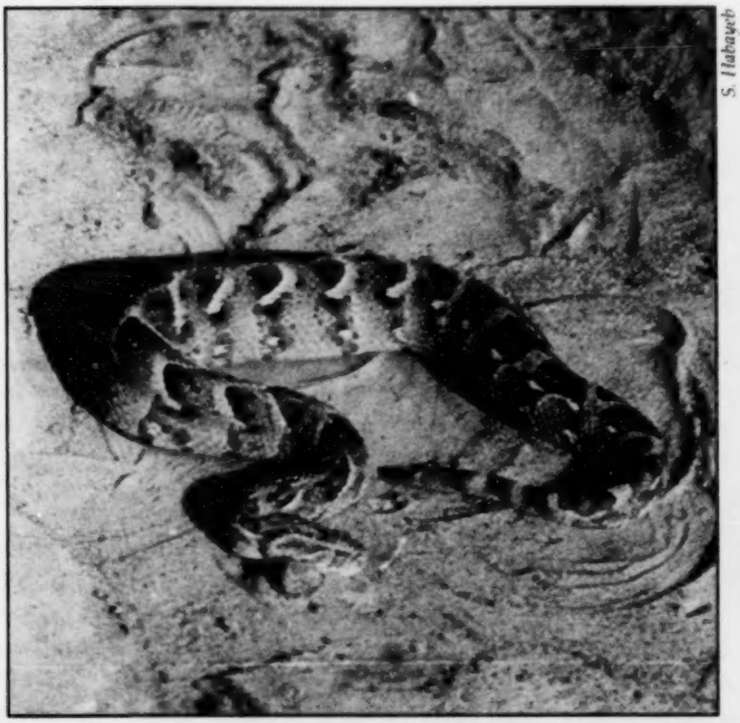
Behavior — Largely nocturnal but may be encountered during day. Large, bad tempered, slow moving, but can strike with amazing speed and force. Usually encountered along paths or around buildings, waiting for prey (rodents, other small mammals, birds, amphibians, lizards). Its camouflage makes it difficult to see; this, coupled with snake's tendency to hold its ground, accounts for many snakebites. When excited, inflates body, hisses loudly, but may strike without warning.

Risk — *Bitis arietans* venom very toxic, demonstrating anticoagulant activity and procoagulant properties via platelet aggregation. Venom yield high, fangs exceptionally long (12-18 cm). Although not all bites result in envenomation, a bite by this species is serious, requiring immediate medical attention.

Clinical symptoms — Envenomation is characterized by enormous swelling. Onset of symptoms can be extremely rapid. A bite on a toe or finger may cause gross swelling to the groin and/or armpit. Pain at bite site is extreme, there is massive shock (including pallor, faintness, sweating, nausea, vomiting, dilated pupils, weak pulse, cold clammy skin), and extensive tissue damage. Regional lymph nodes become enlarged, painful. Blood continues to ooze from punctures; after about 18 hours, blood may appear in saliva, urine, feces, vomitus, and small and large petechial hemorrhages may be seen beneath mucous membranes and under skin. Large blisters develop in region of bite. At about same time (or slightly earlier) true shock becomes apparent, with a drop in blood pressure, weakness, dizziness, nausea and vomiting, semiconsciousness or periods of unconsciousness. In untreated cases where shock does not intervene, hemorrhages extend to brain, resulting in convulsions and death. Hemorrhagic activity of venom especially high. Necrosis around bite site common, extensive. Necrosis around fang punctures caused by proteolytic action of venom; more extensive necrosis caused by interference with blood supply to affected part as result of pressure of subfascial edema or thrombosis of major vessels. Damage may be extensive; may require amputation or result in permanent impairment of function. Never use constrictive bandages or tourniquets on puff adder bites. Massive amounts of antivenom may be required (up to 30 vials) to properly treat bite of this species. Precautions must be taken to prevent serum sickness.

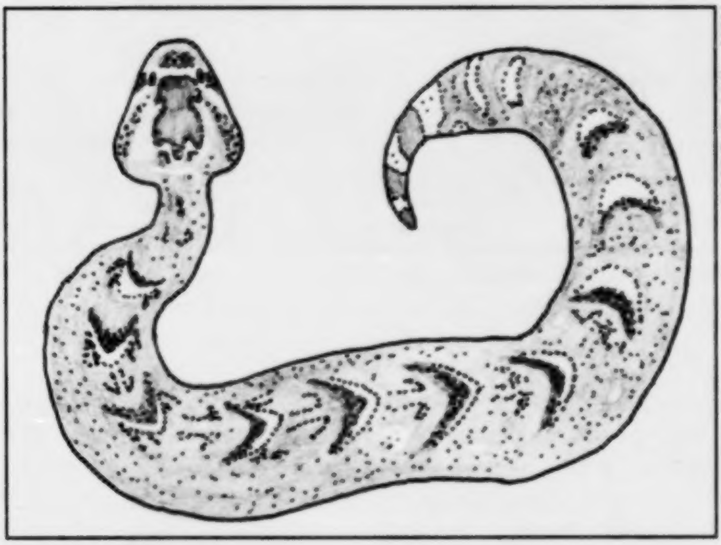
ANTIVENOMS:

PAST: "Antirept Pasteur", "*Bitis-Echis-Naja*", "Pasteur Isper Afrique"
BEHR: "North Africa and West Africa", "Central Africa"
SAMIR: "Polyvalent"
FITZ: "Polyvalent", unnamed cobra-*Bitis* polyvalent



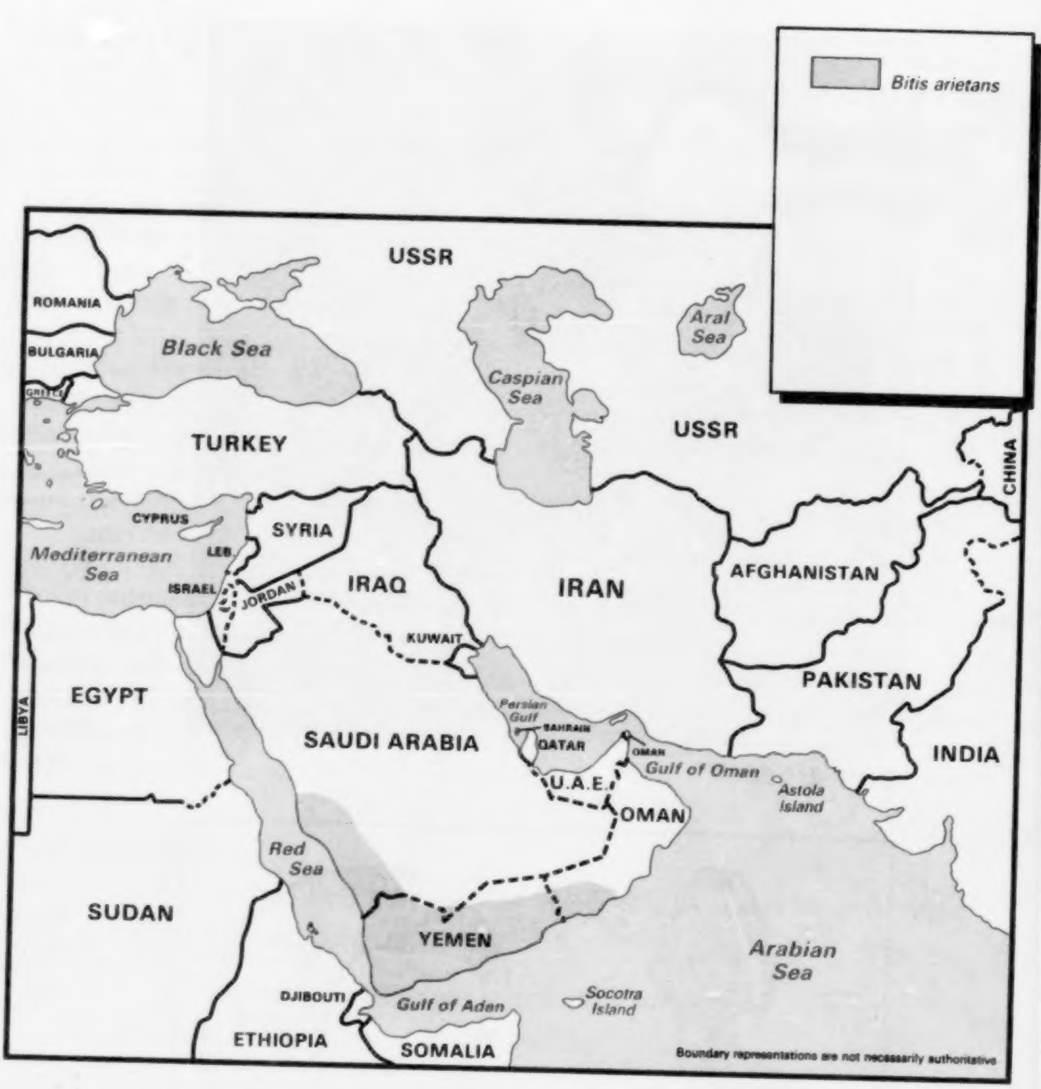
S. Habayeb

Bitis arietans



HMC R. D. Miller, USN

Bitis arietans



Boundary representations are not necessarily authoritative

Cerastes cerastes

RISK CATEGORY III	(Minor risk). Venom mildly toxic.
Common names —	Horned asp, desert horned viper, horned sand viper, Sahara desert viper, sidewinder horned viper
Subspecies —	*Cerastes cerastes cerastes* *Cerastes cerastes gasperetti*

Distribution/habitat — Found in Egypt, Israel, Iraq, and all countries of Arabian peninsula. Inhabits deserts where there are rock outcroppings, fine sand; often found in very arid places and in oases. Usually hides in rodent holes and under rocks.

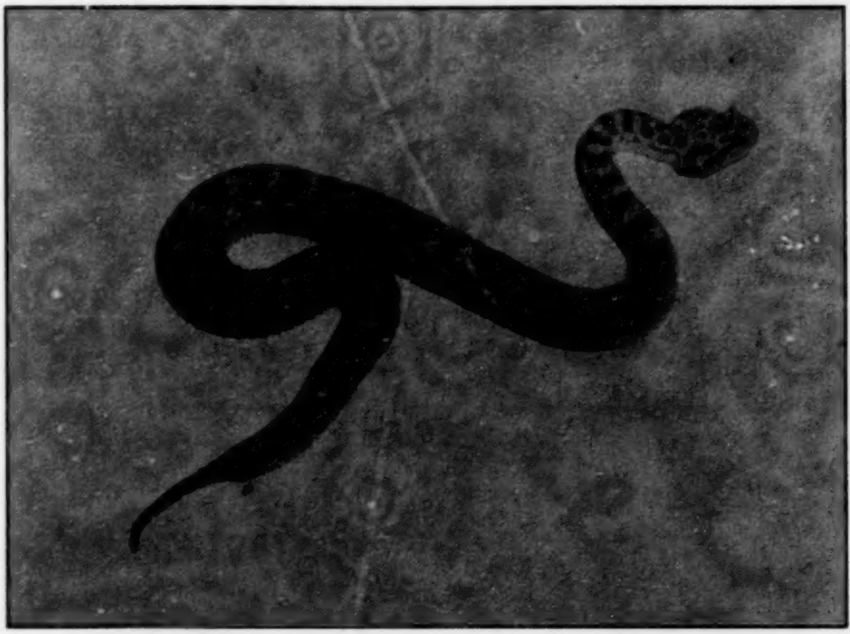
Identification — Average length 0.5 to 0.6 meters; maximum length 0.8 meters. Head wide, triangular, with long spine-like horns above each eye (on some horns may be short or absent). Body thick, tail short with abrupt taper. Head covered with small irregular, tube-keeled scales; fourteen or more scales in one line between eyes; no other enlarged scales on crown. Eye size small to moderate, pupils vertically elliptical. Snakes dorsal side yellowish, yellowish-brown, pale gray, pinkish, or pale brown, with rows of dark brown, grayish, bluish, or blackish spots, which may fuse into crossbars; underside whitish, tip of tail black.

Behavior — Nocturnal; can make itself all but totally invisible by wriggling down into loose sand. Not particularly large or dangerous, but if disturbed can strike quickly. When angered, rubs inflated loops of body together to make a rasping hiss. Often moves by sidewinding motion. Feeds basically on rodents; mainly active at night.

Risk — Most frequent cause of snakebite in Arabian peninsula, but venom is least toxic. Bites common because frequency of encounter high. Venom hemorrhagic, affecting coagulation.

Clinical symptoms — Envenomation causes deep local tissue damage accompanied by stomach pain, sweating, nausea, occasional vomiting, followed by fever developing in conjunction with gangrene. Local symptoms include edema, redness, internal hemorrhaging, areas of gangrene. Area of edema eventually turns blue, and pustules may appear. Venom has coagulant activities at low concentrations, anticoagulant activities at high concentrations. Victims usually recover without antivenom.

ANTIVENOMS:
BEHR: "North and West Africa", "Near and Middle East"
PAST-ALG: "Antiviperin"
IRAN: Poly-specific
SAIMR: "Echis"
PAST: "Antirept Pasteur"

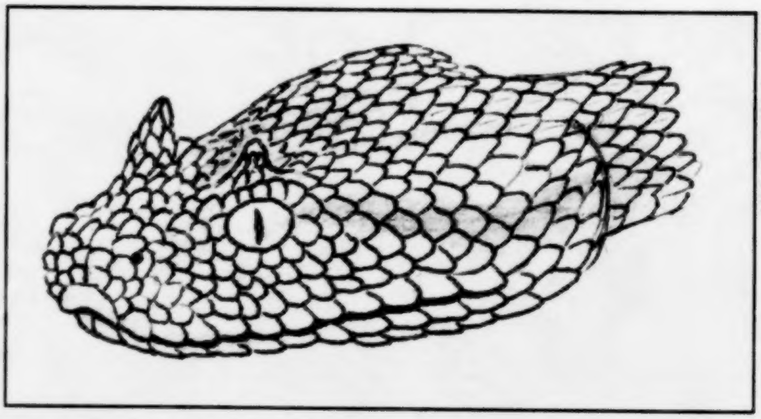


L. Newburn

Cerastes cerastes

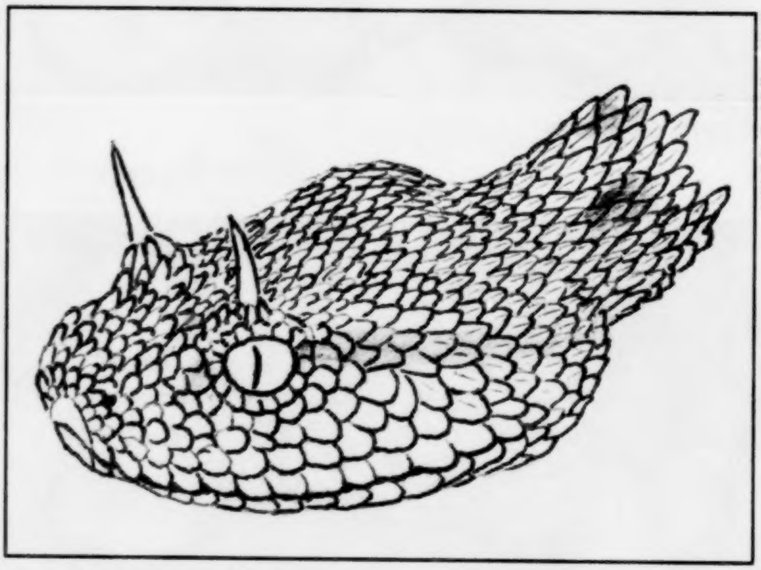
D. Hamper

Cerastes cerastes cerastes



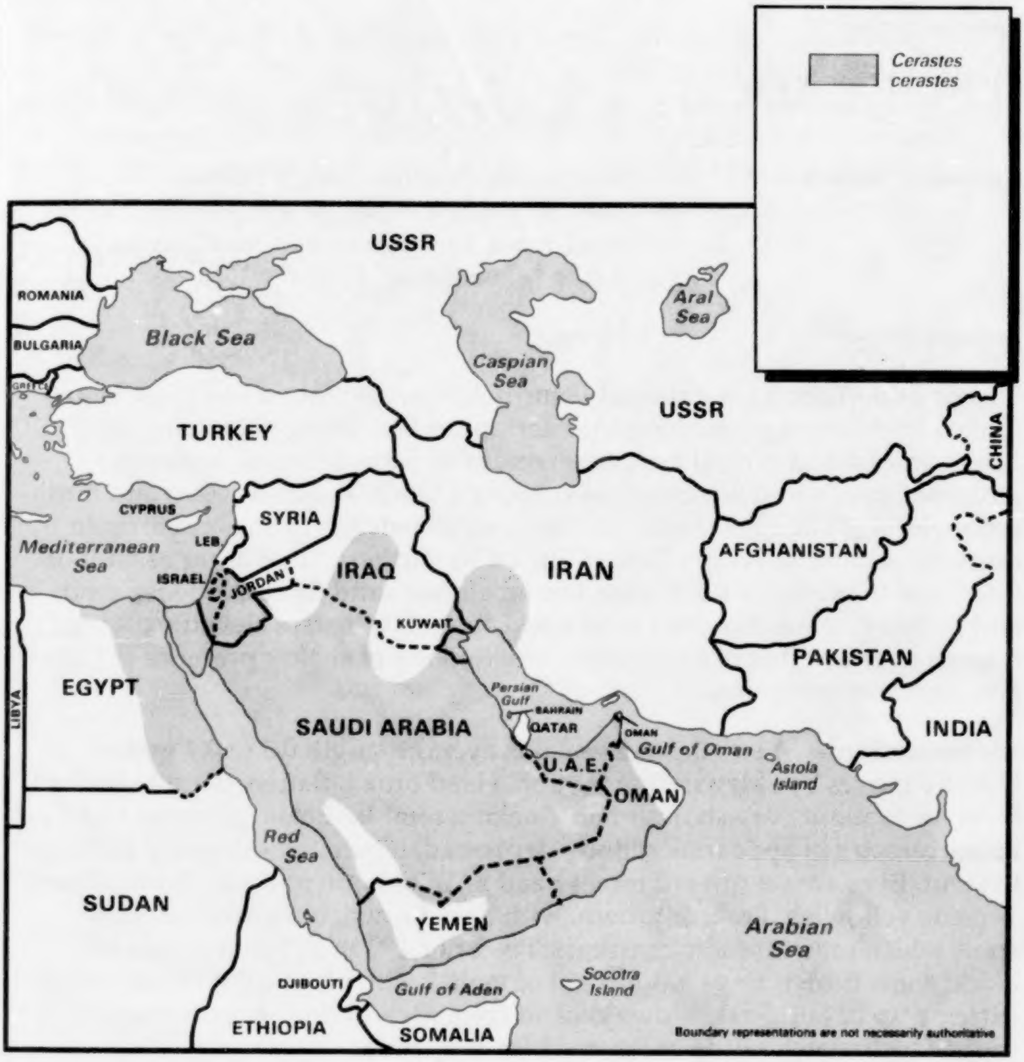
HMC R. D. Miller, USN

Pseudocerastes persicus; head



HMC R. D. Miller, USN

Cerastes cerastes; head
Comparing "horn" formations



Boundary representations are not necessarily authoritative

Cerastes vipera

RISK CATEGORY IV (Little risk). Frequency of envenomation low, venom only slightly toxic.

Common names — Asp, lesser *Cerastes* viper, Avicenna's viper, Sahara hornless viper, Avicennaviper, Sahara sand viper, Cleopatra's asp, small-ringed snake "eken gaton" (Hebrew)

Subspecies — None

Distribution/habitat — Primarily North Africa; also found in Egypt, Israel. Occurs in desert regions along Mediterranean Sea, along Nile Valley in Egypt, in east and central Egyptian regions of Sahara Desert, in desert regions of Egypt's Red Sea coastline (to Suez Canal), and in western and northern regions of Sinai Peninsula. In Israel, range extends from Gaza Strip to northern regions of Negev Desert. Found in northern Sinai as far as Gulf of Suez, and in region of Ras Sudar. Found among sand dunes, in loose sand, and in desert shrub from sea level up to about 300 meters elevation. Range seldom overlaps that of *Cerastes cerastes*. Reports of snakes presence in Lebanon probably erroneous.

Identification — A small, stocky snake; average length 0.3 to 0.4 meters. Usually moves by sidewinding motion. Head broad, flattened, quite distinct from neck; snout very short, broad. Snake resembles Echis carinatus and Cerastes cerastes in appearance. Body depressed, tapered, moderately slender to stout. Eyes are set toward top of head in an oblique position; horns absent. Topside yellowish, gray, or brown, with dark brown, bluish, or blackish spots which may fuse into crossbars. Posterior 1/2 to 2/3 of female's tail black; some brown rings around tail of males, with black color restricted to extreme tip of tail. Snakes always sand colored, with indistinct brownish spots which match sandy areas in which they occur.

Behavior — Usually spends day buried in sand at base of scrub. Buries itself to escape predation, to lower body temperature, or to ambush prey. When buried in sand, only the snout and eyes remain above the surface. Is not aggressive, but can be short tempered. When provoked, gathers body into a coil, rubs its sides together to produce a hissing noise. Lifts tail to imitate insect larva to attract prey.

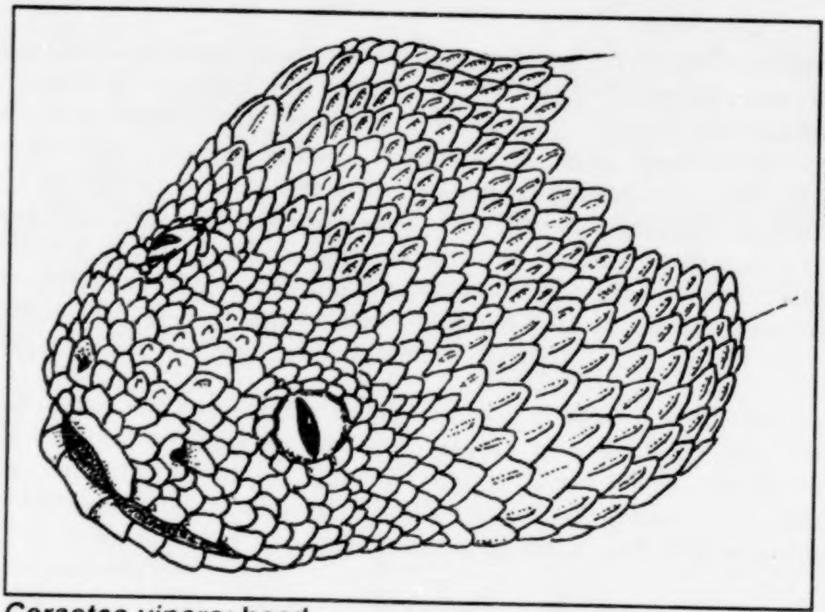
Risk — Apparently relatively harmless to adults. Venom has cytotoxic, neurotoxic, and myotoxic elements.

Clinical symptoms — Bite reportedly painful, but usually not serious. Following envenomation with a sublethal dose, mild hemolysis gradually appears within 15 minutes, ceases in less than 1 hour. Minor local swelling and tenderness and a small hematoma (with fang marks) have been reported. Bleeding from wound, is prolonged but systemic signs are not observed. Venom not highly toxic, venom yield relatively small.

ANTIVENOMS:
BEHR: "North and West Africa"
PAST: "Antirept Pasteur"
SAIMR: "*Echis*"

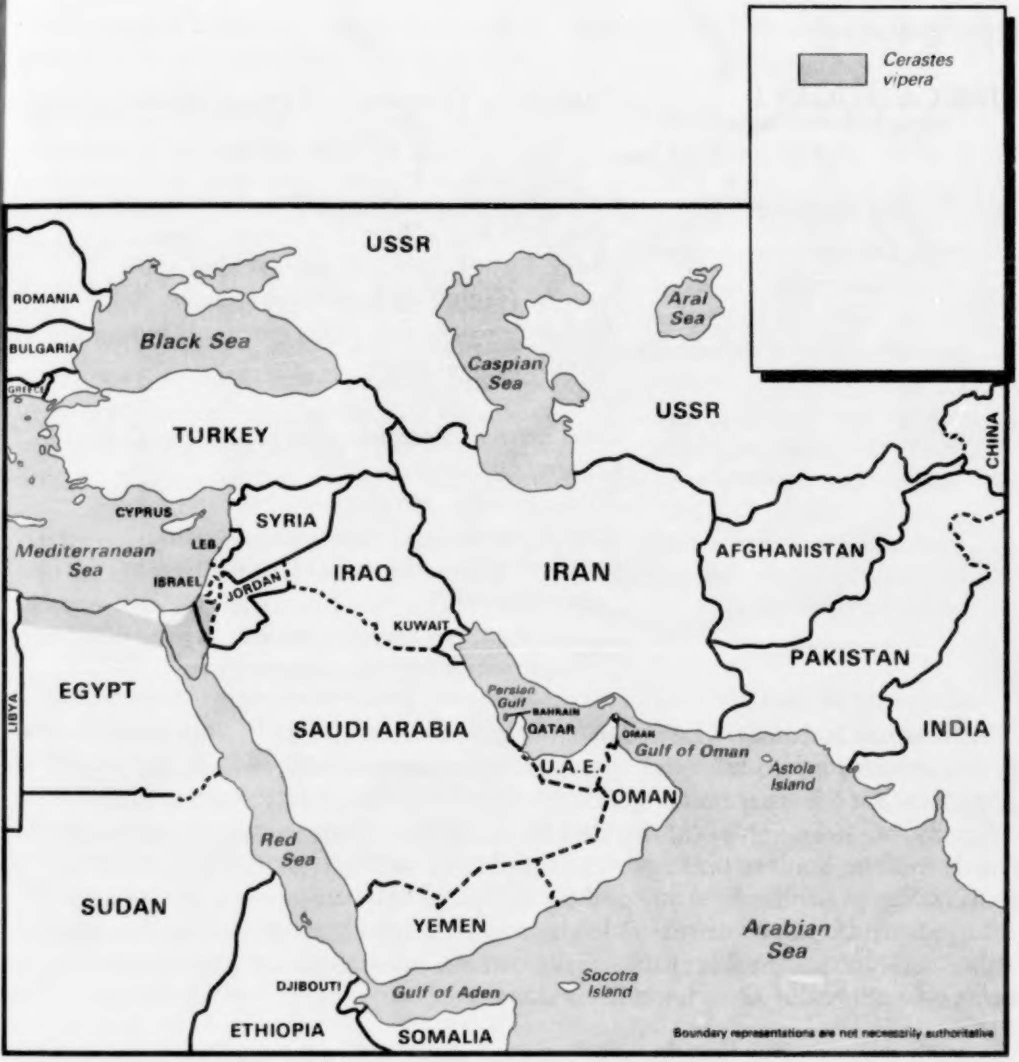
J. Tashjian

Cerastes vipera



HMC R. D. Miller, USN

***Cerastes vipera*; head**


▨ *Cerastes vipera*
USSR
ROMANIA
BULGARIA
GREECE
Black Sea
Caspian Sea
Aral Sea
USSR
TURKEY
CHINA
CYPRUS
SYRIA
LEB.
Mediterranean Sea
ISRAEL
JORDAN
IRAQ
IRAN
AFGHANISTAN
KUWAIT
PAKISTAN
LIBYA
EGYPT
Persian Gulf
BAHRAIN
QATAR
SAUDI ARABIA
OMAN
Gulf of Oman
Astola Island
INDIA
U.A.E.
OMAN
Red Sea
SUDAN
YEMEN
Arabian Sea
DJIBOUTI
Gulf of Aden
Socotra Island
ETHIOPIA
SOMALIA
Boundary representations are not necessarily authoritative

Echis species

RISK CATEGORY I (High risk). Frequency of envenomation high, venom highly toxic.

Species/common names — *Echis carinatus* - carpet viper, saw-scaled viper
Echis coloratus - Burton's carpet viper, adder, Egyptian viper, saw-scaled viper, "ep'eh" (Hebrew) *Echis pyramidium* - (formerly known as *Echis carinatus pyramidium*) Egyptian saw- scale

Subspecies — *Echis carinatus astoles* (also known as *Echis sochureki astoles*)
Echis carinatus multisquamatus (also known as *Echis multisquamatus*)
Echis carinatus sochureki (also known as *Echis sochureki*)
Echis coloratus - no subspecies
Echis pyramidium - no subspecies

Distribution/habitat — *Echis carinatus astoles* - Astola Island, Pakistan *Echis carinatus multisquamatus* - eastern Iran, northwestern border of Afghanistan. *Echis carinatus sochureki* - Iran, Afghanistan, Pakistan *Echis coloratus* - eastern Egypt (along Red Sea and Sinai Peninsula), Israel, western Saudi Arabia, Yemen, and Socotra Island (part of Yemen). *Echis pyramidium* - eastern Egypt (along Red Sea and Sinai Peninsula), western Saudi Arabia. All are found in large numbers in deserts and dry areas. Also found in sandy areas, rocky areas, and scrub forests from sea level to about 1,800 meters. *Echis coloratus* not found in sandy places.

Identification — Average length *Echis coloratus*, 0.5 to 0.7 meters; others, 0.4 to 0.6 meters. Body slender to moderately stout, slightly flattened vertically. Head short, distinctly wider than neck; light-colored trident, cruciform, or arrow-shaped mark on top (mark missing on *Echis coloratus*). Pale stripe from each eye to angle of mouth. White chin and throat. Topside: (*Echis coloratus*) yellowish-gray, light brownish-gray, or (in southern Israel's granite mountains) pale blue-gray, with gray to tan or bright reddish or pinkish, dark-edged blotches; *(E. carinatus and E. pyramidium)* buff or tan, to olive brown or chestnut with dark-edged whitish spots along backbone, narrow, undulating white line along sides (upper portions of loops more conspicuous than lower portions). Underside: white, grayish-white, yellowishwhite, pale pinkish-brown, stippled with dark gray. Tail short, tapers abruptly, about 10 percent of total body length.

Behavior — Primarily nocturnal in hot weather (may be active at dusk); sometimes diurnal in cool weather. May be found basking during early morning in bushes more than 2 meters above ground. Basks in the open during cooler weather, but found more frequently under rocks or in mounds of dead plant stalks. Can bury itself in sand with only head exposed. Fairly active, can move rapidly in a side winding motion. In dry weather, hunts prey almost entirely at night, but may hunt by day in cool weather. Very alert and easily excited. Can be aggressive (*Echis coloratus* less aggressive). Likely to flee when encountered, but has been reported to chase victims aggressively. Assumes a defensive Figure - C coil when encountered, rubbing inflated loops of body together to make a distinctive hiss-like rasping sound. Strikes quickly and repeatedly with considerable reach for a small snake.

Risk — Venom highly toxic. Snake involved in many snakebite incidents and fatalities. Considered to be world's most dangerous snake because of its venom toxicity, its abundance near cultivated areas, and its aggressive, easily excitable temperament.

Clinical symptoms — Venoms are hemotoxic, demonstrating procoagulant activity (forming blood clots), anticoagulant activity (preventing formation of blood clots), defibrinolytic activity (breaking down blood clots already formed), and proteolytic activity (breaking down tissue proteins). Resultant cerebral bleeding may cause central nervous system damage. Envenomation causes pain and swelling at bite site; also often local hematoma and ecchymosis due to anticoagulant and proteolytic properties of the venom. Necrosis develops around bite site in rare cases. Systemic symptoms include decreased blood pressure, fever, and bleeding from gastrointestinal tract, mucous membranes, bite wounds, muscles, subcutaneous tissues, and urinary tract.

ANTIVENOMS: Antivenoms apparently effective only if prepared from venoms of same geographic taxonomic group.

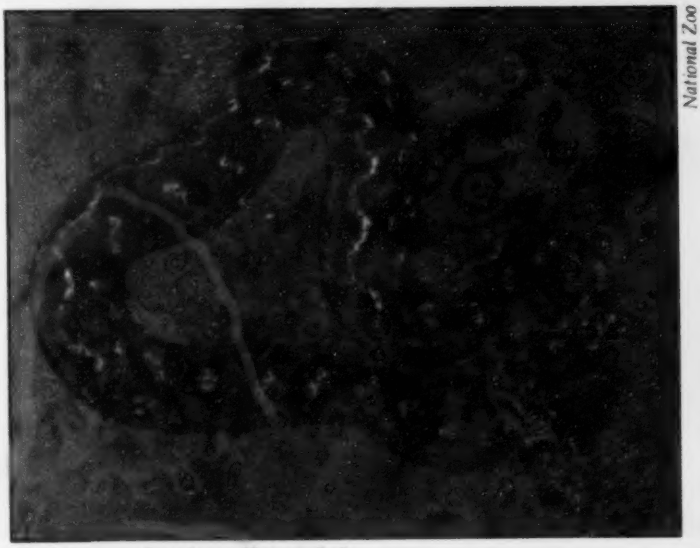
Echis carinatus
Echis pyramidium

BEHR: "Near and Middle East"
"North and West Africa"
HAFF: "*Echis*"
"Polyvalent Anti-snake Venom Serum"
IRAN: "Monospecific *Echis* Antivenom"
Poly-specific
KASA: "Polyvalent"
NIH: "Anti-snake Venom Serum Polyvalent"
"*Echis* Monovalent"
PAST: "Antirept Pasteur"
"*Bitis-Echis-Naja*" (if available)
"Near and Middle East" (if available)
"Pasteur Ipser Afrique"
SAIMR: "*Echis*"
TASH: "Monovalent *Echis carinatus*",
"Polyvalent *Naja* and *Echis*"

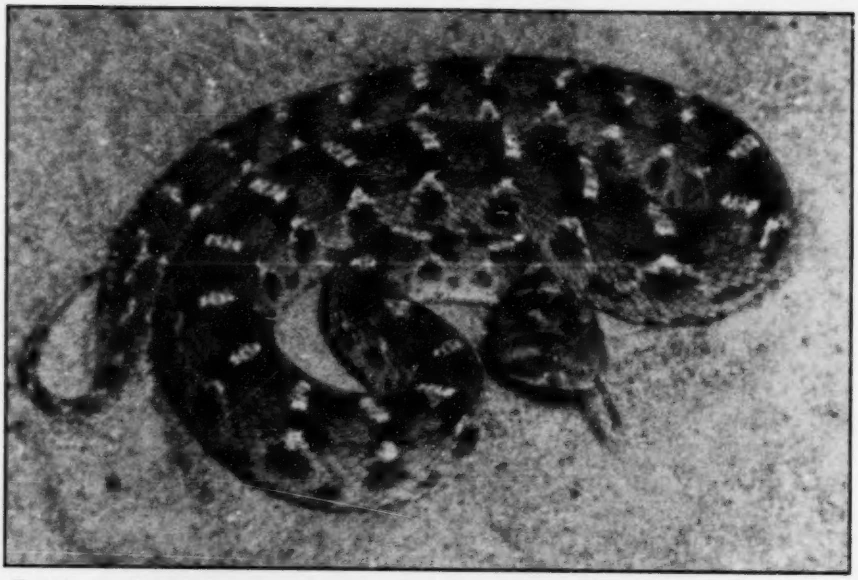
Echis coloratus
ROGO: "Arabian *Echis*"
SAIMR: "*Echis*"
Possibly effective, *Echis carinatus/pyramidium* antivenoms listed above.

National Zoo

Echis carinatus (female)

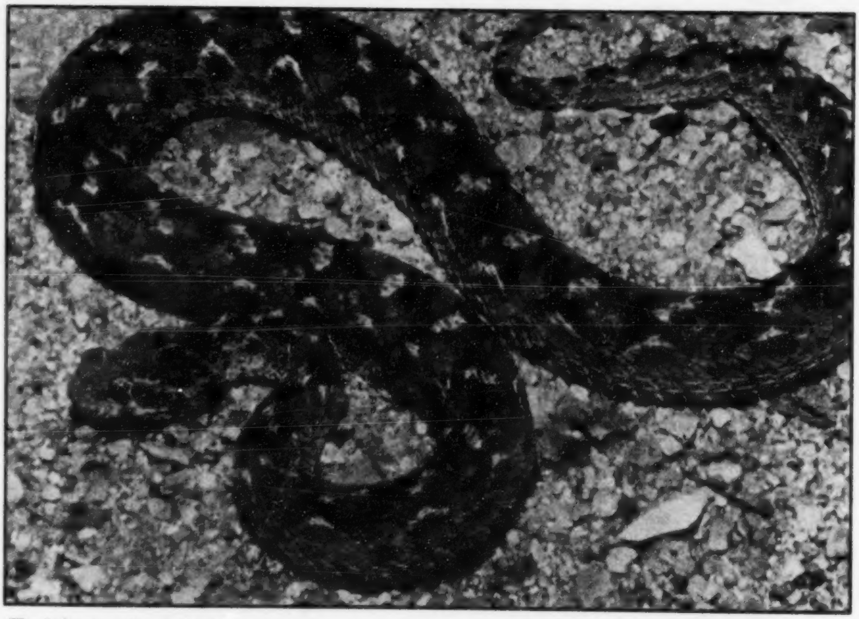

National Zoo

Echis carinatus (female)



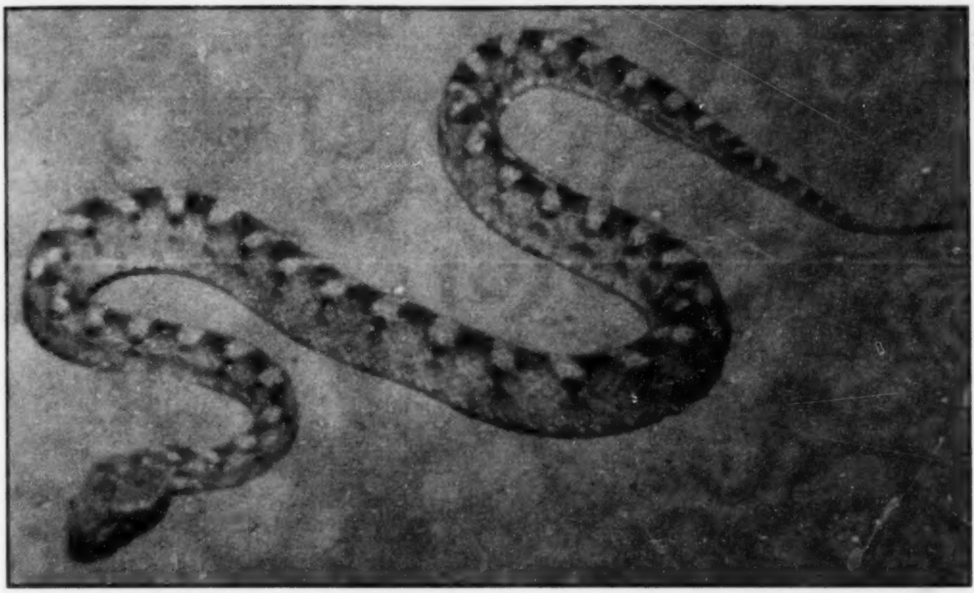
E. Sochurek/J. Tashjian

Echis carinatus

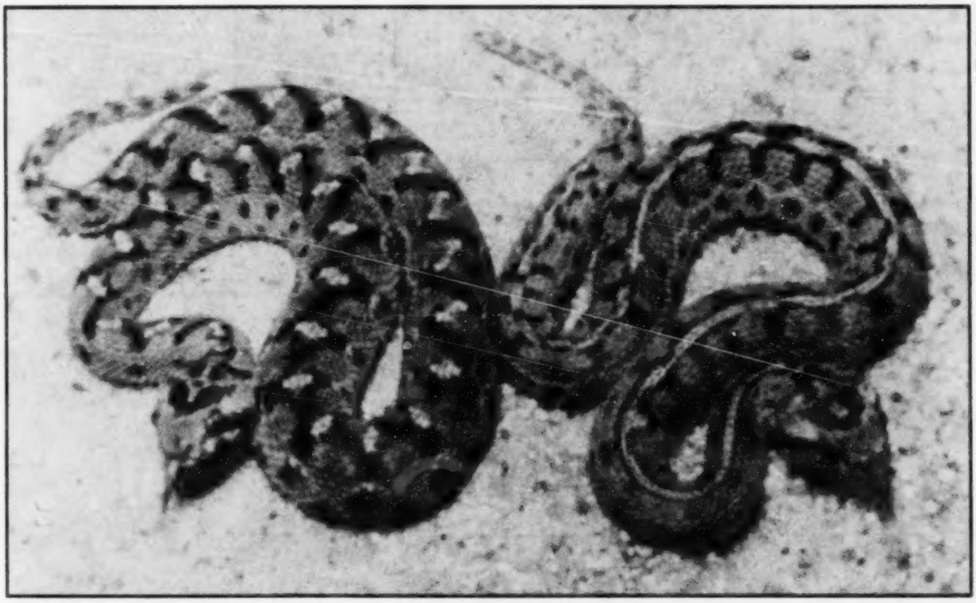


J. Tashjian

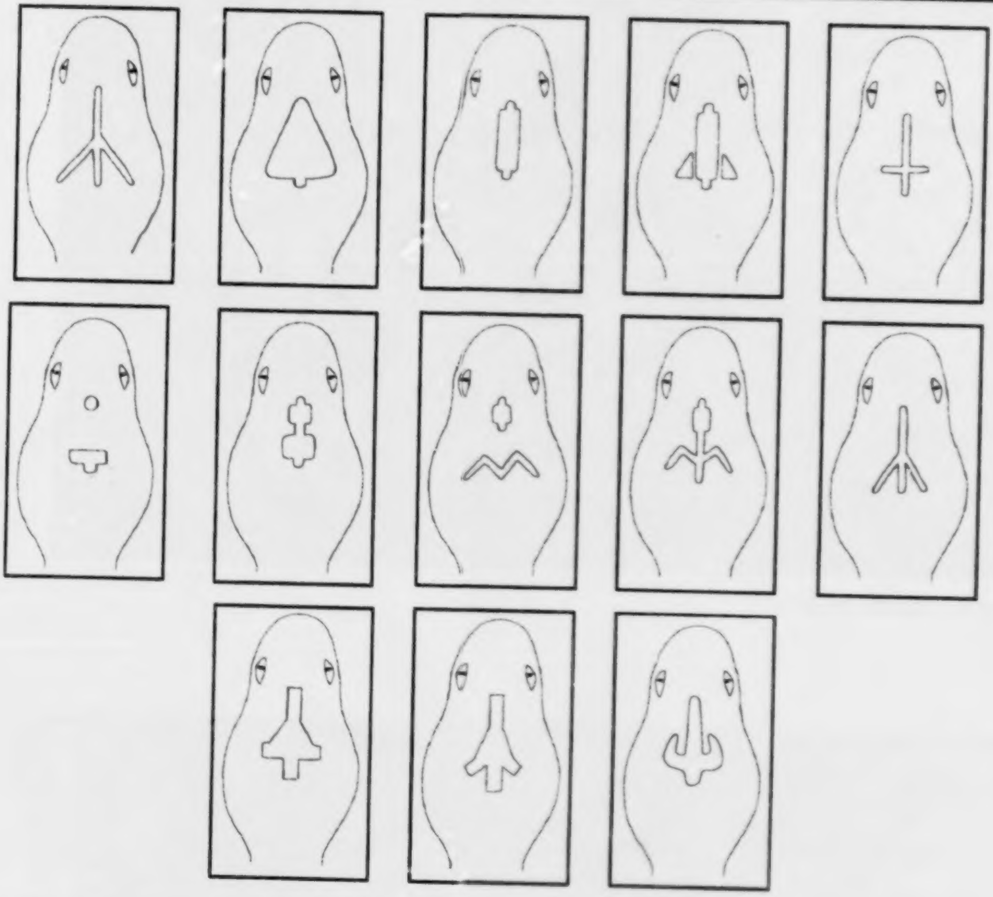
Echis coloratus



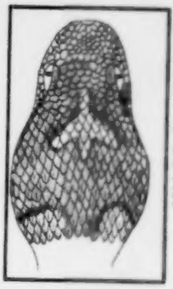
Echis coloratus



Echis pyramidium



Head markings for *Echis* species



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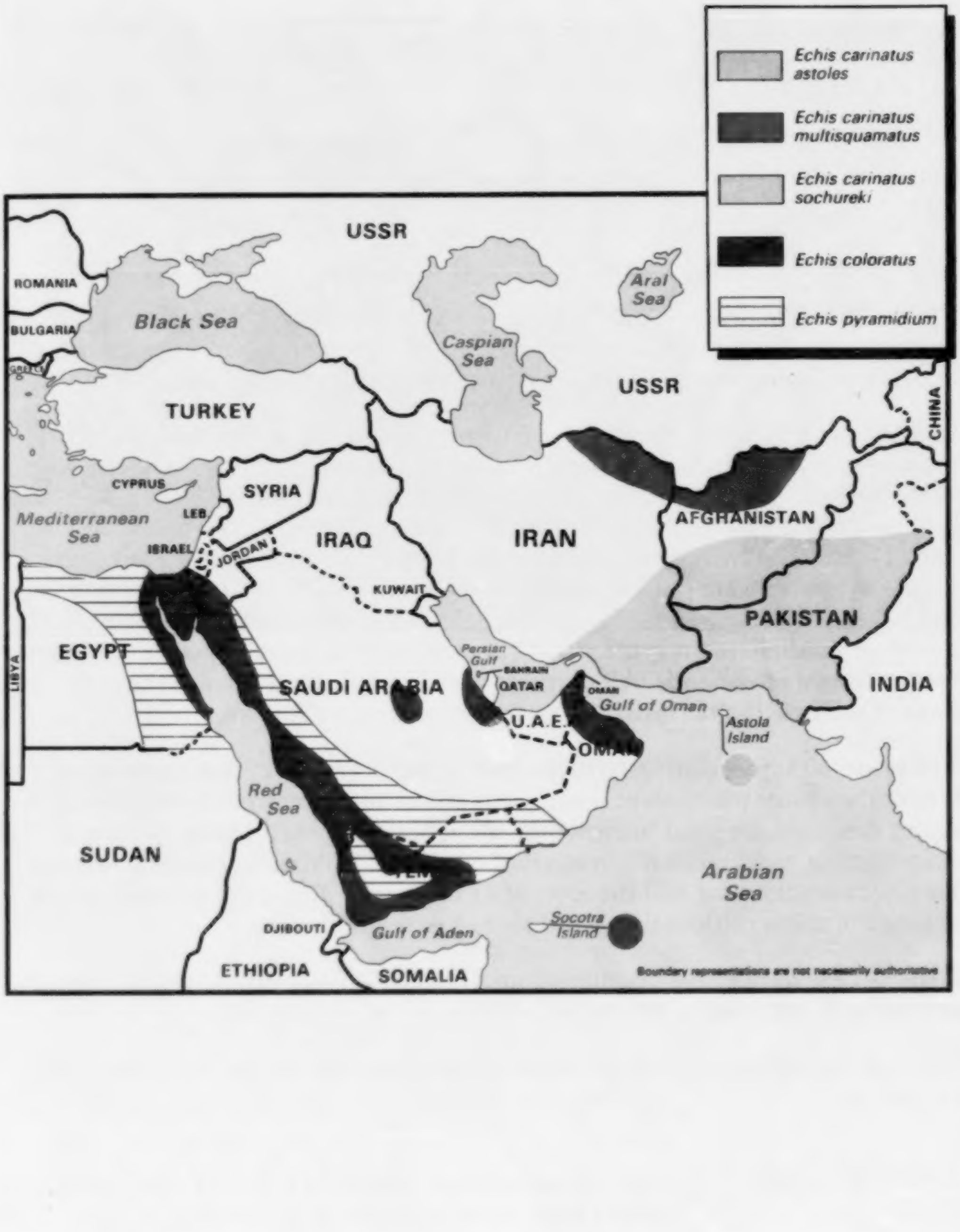
Echis carinatus multisquamatus

HMC R. D. Miller, USN



Eristocophis macmahoni

RISK CATEGORY II	(Moderate Risk). Frequency of envenomation; venom highly toxic.
Common name —	Asian sand viper, leaf-nosed viper, McMahon's viper
Subspecies —	None

Distribution/habitat — Snake's range restricted to desert basin regions of western Baluchistan, southwestern Afghanistan, southeastern Iran. Found almost exclusively on sand dunes and at elevations less than 1,200 meters.

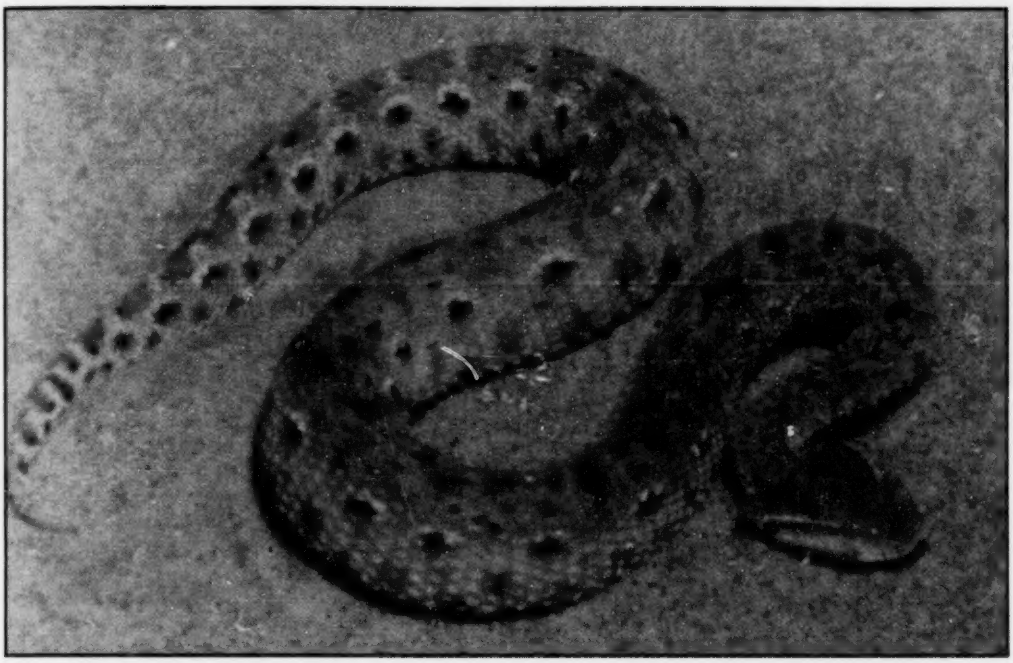
Identification — Average length 0.6 meters. Head large, flattened, quite distinct from neck. Snout broad, short. Eye size moderate, pupils vertically elliptical. Nostrils slit-like. Body stout, strongly flattened along side of back, abruptly tapering tail; skin soft and loose. Crown covered by small scales. A narrow whitish line runs from above eye to angle of mouth; scattered dark flecks on top of head. Dorsal base color light tan to khaki, with a series of 20 to 25 small black lateral spots each surrounded partly or completely by group of smaller cream spots. Young snakes have series of about 30 darker brown dorsal crossbands. All markings are more distinct toward the rear. Base of tail has distinct crossbands, tip unmarked, yellowish.

Behavior — Active during twilight and at night. Found in fine loose sand where they bury themselves leaving the snout and eyes free of sand. Snake's scales designed for sand burrowing. Alert, bad-tempered snake. Resorts to sidewinding movement when hurried or alarmed. When agitated, it hisses loudly, raises its head and the loop of its body well above the ground (in the manner of some rattlesnakes), and strikes with great vigor.

Risk — Less dangerous because of small size, but has caused serious envenomation and, reportedly, has caused deaths.

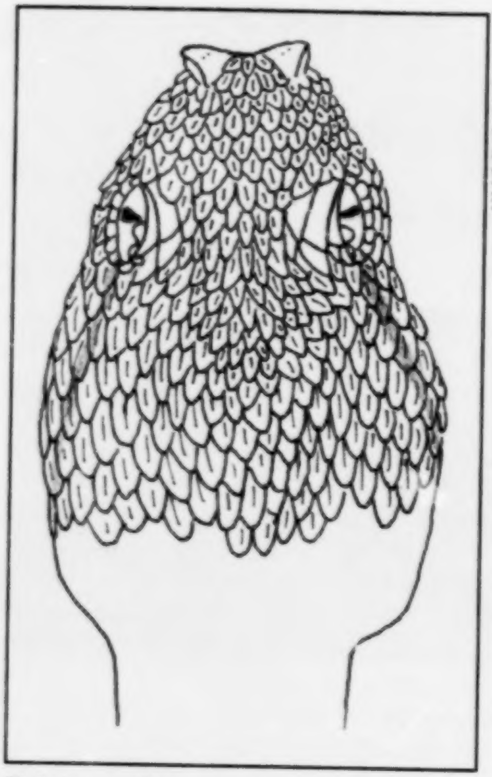
Clinical Symptoms — Venom shows strong hemorrhagic activity like *Echis carinatus*.

ANTIVENOMS:	No specific antivenom available. Possibly effective:
PAST:	"Pasteur Isper Afrique", "Antirept Pasteur"
NIH:	"Polyvalent"
HAFF:	"Polyvalent"
BEHR:	"North and West Africa", "Near and Middle East"



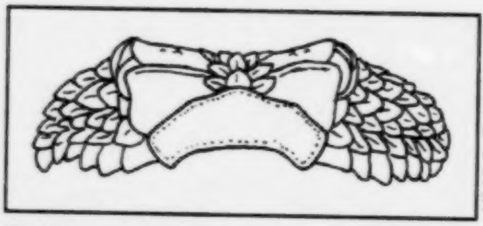
I. Tashjian

Eristocophis macmahoni



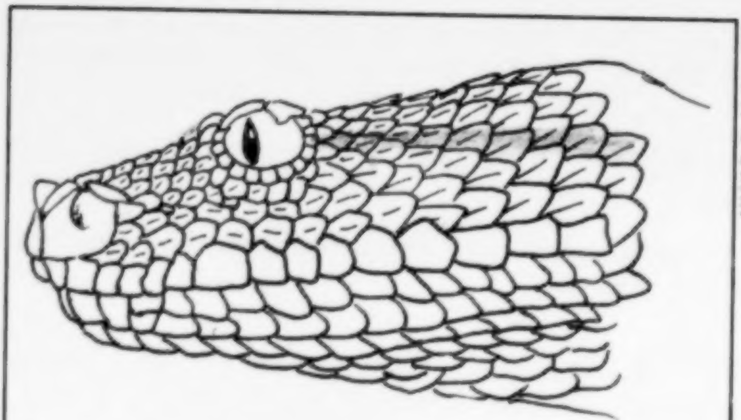
HMC R. D. Miller, USN

Eristocophis macmahoni; head, dorsal view



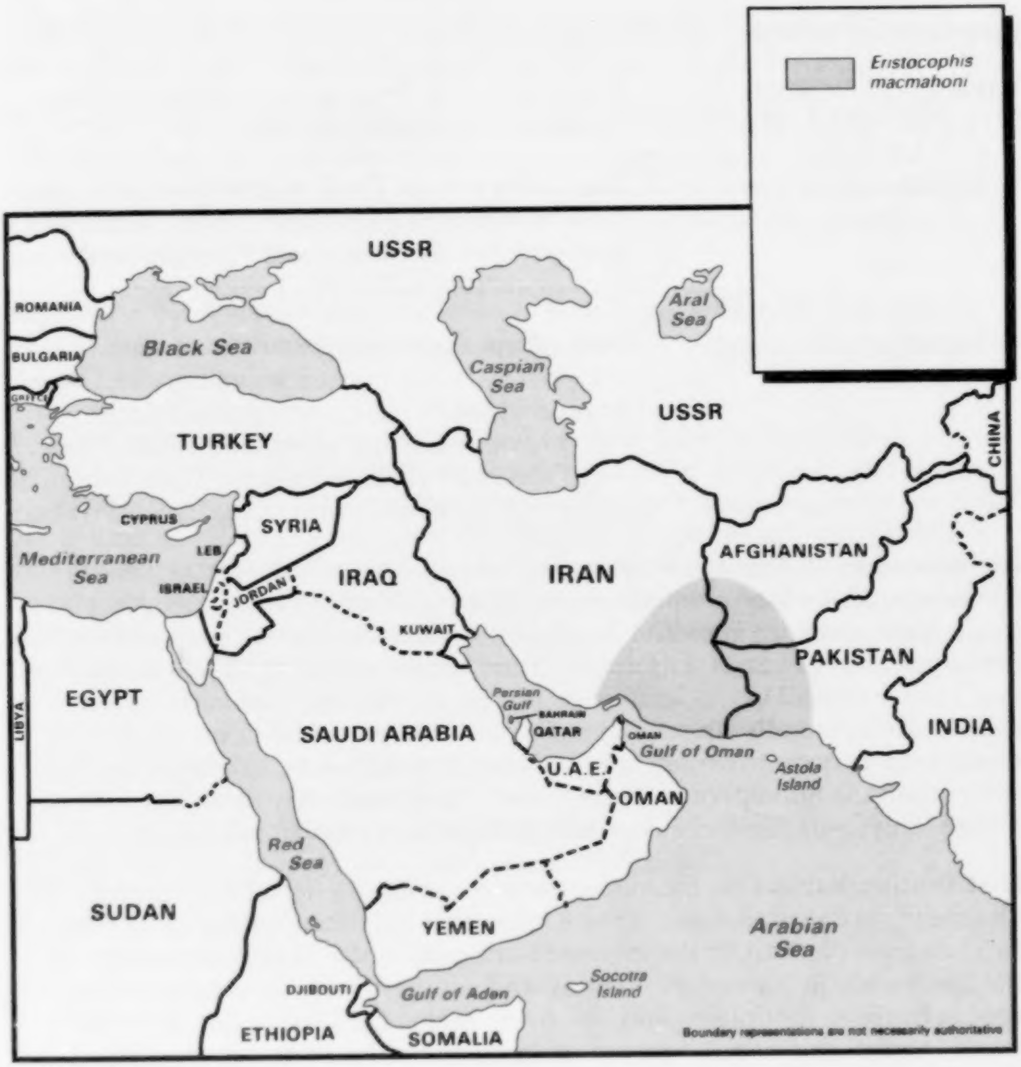
HMC R. D. Miller, USN

Eristocophis macmahoni; head, vental view



HMC R. D. Miller, USN

Eristocophis macmahoni; head, lateral view



Eristocophis macmahoni
USSR
ROMANIA
BULGARIA
GREECE
Black Sea
Caspian Sea
Aral Sea
USSR
CHINA
TURKEY
CYPRUS
SYRIA
Mediterranean Sea
LEB.
ISRAEL
JORDAN
IRAQ
IRAN
AFGHANISTAN
KUWAIT
PAKISTAN
EGYPT
LIBYA
Persian Gulf
BAHRAIN
QATAR
SAUDI ARABIA
OMAN
Gulf of Oman
Astola Island
INDIA
U.A.E.
OMAN
Red Sea
SUDAN
YEMEN
Arabian Sea
DJIBOUTI
Gulf of Aden
Socotra Island
ETHIOPIA
SOMALIA
Boundary representations are not necessarily authoritative

Pseudocerastes persicus

RISK CATEGORY II	(Moderate risk). Frequency of envenomation moderate; venom highly toxic.
Common names —	Eye-horned viper, Persian desert horned viper, false horned viper, Persian horned viper, Field's horned viper, horned desert viper, horned snake shepipon (Hebrew)
Subspecies —	Two subspecies occur in southwest Asia. *P.p. persicus*: False horned viper, Persian Desert horned viper, Persian horned viper (Iran) *P.p. fieldi*: Eye-horned viper, false horned viper, Field's horned viper, shepipon, Trans-Jordanian viper (Egypt, Israel, Jordan, Iraq, Saudi Arabia)

Identification — Average adult length 0.5 to 0.7 meters; maximum length 0.9 meters. Males larger than females. Snake wide relative to its length. Head short, wide, quite distinct from neck. Snout blunt, with small scale-covered horns just above eyes. A dark brown band marks side of head just around eye. Eyes are small to moderate size, pupils are elliptical vertically. Nostrils located dorsolaterally present. Dorsal coloration pale gray or bluish gray to khaki with gray or brownish gray blotches or crossbands, usually much narrower than the interspace between them. Throat and body sides have alternating faint spots. Ventral side white, tail black, narrow in relation to body.

Distribution/habitat — *Pseudocerastes persicus persicus:* found in southern Afghanistan; in Pakistan, west of the Kirthar and Sulaiman ranges as far north as 32 degrees N.; Iran, in the extreme northeast, in the Zagros Mountains in the southwest, in the eastern, central, and southern parts of the country except in the high mountains and the desert regions of Dashte Lut; in the far north. An isolated population occurs in northern Oman and in the United Arab Emirates.

Pseudocerastes persicus fieldi: found in southwestern Iraq as far north and east as the Euphrates, in Jordan, and in southern Israel. One specimen was found in the Sinai in Egypt.

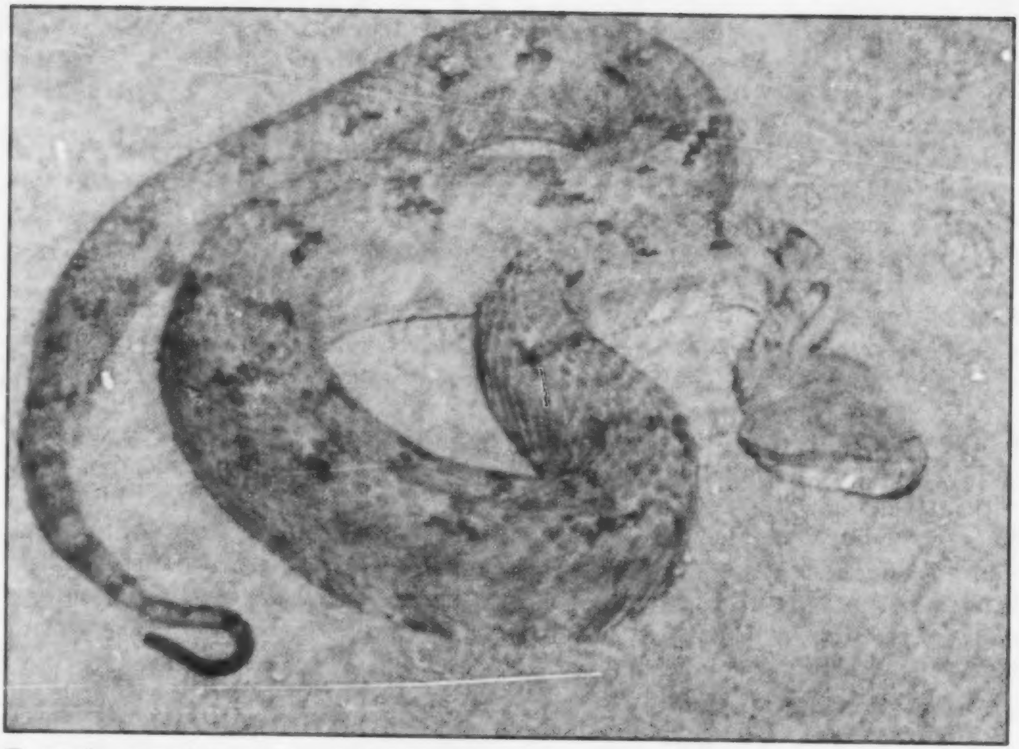
Pseudocerastes persicus: found in sandy, rocky terrain up to elevations of approximately 2,000 meters. Has been found at 1,500 meters elevations in Iran and Baluchistan. Found in flat, sandy regions with desert vegetation, in rocky areas in burrows and crevices. In Israel, has been found in Dinona, Sede Boqer, Har Hanagev, Michtash, Rimon, central and southern Sinai, and the southern Negev Desert. Its customary habitat is desert bushes.

Behavior — *Pseudocerastes persicus*; nocturnal. Sluggish, placid, less likely to bite during day, dangerously active and aggressive at night. When disturbed, will hiss loudly but is not particularly vicious. Snake's locomotion characteristically sidewinding. Frequently will hide in rodents tunnels and underneath rocks.

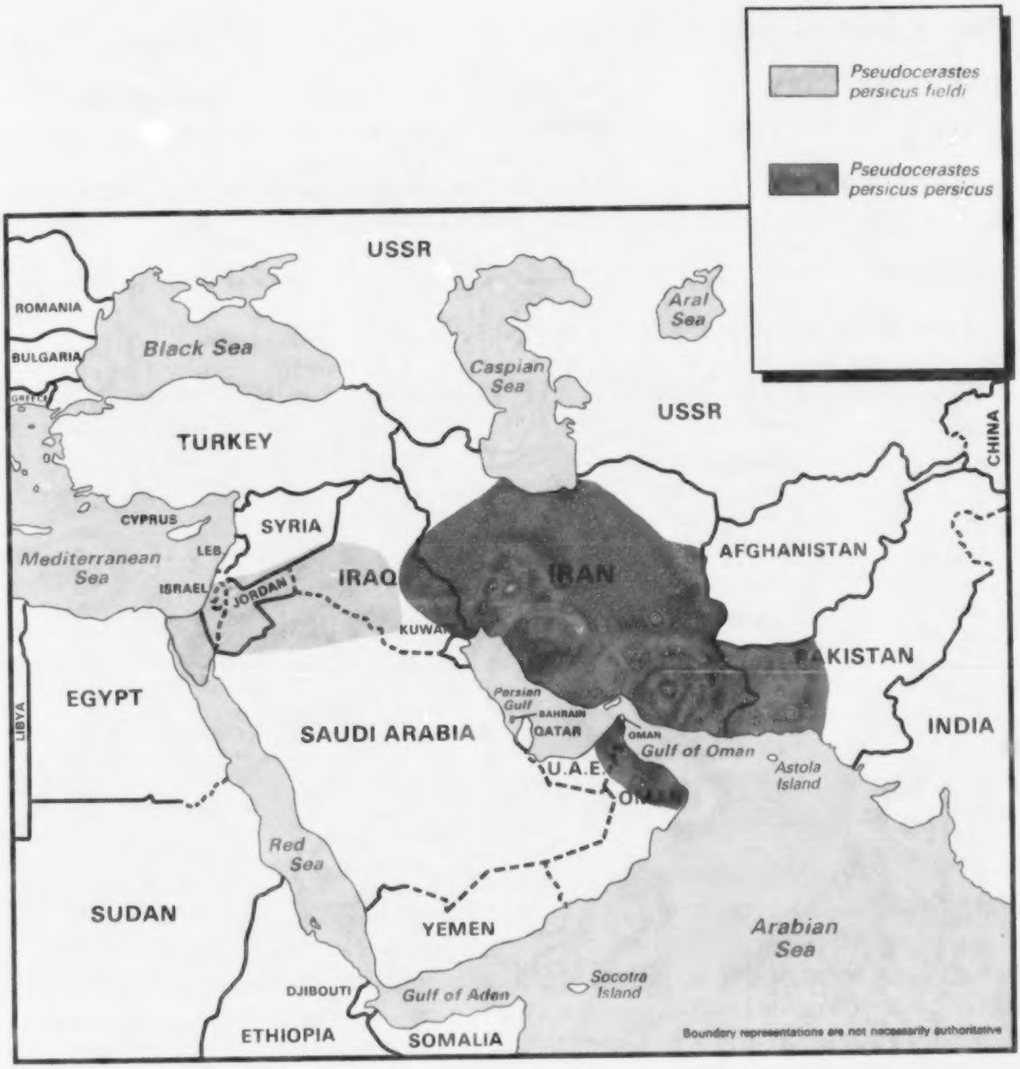
Risk —*P.p. fieldi* venom has little or no hemorrhagic activity; *P.p. persicus* venom moderately to highly hemorrhagic. The less hemorrhagic *P.p. fieldi* venom is more toxic.

Clinical symptoms —These two snakes' venoms differ in their effects on victims. *Pseudocerastes persicus fieldi* venom characterized as neurotoxic, may produce few local symptoms, usually consisting of minor pain, mild tingling of the limb or local area, impaired digital dexterity, stiffness; more serious envenomation causes weakness followed by ptosis. Victim will be conscious but cannot respond due to paralysis. *Pseudocerastes persicus persicus* venom characterized as hemorrhagic, causes localized, followed by systemic, symptoms. Local symptoms include local pain, hematoma. More severe cases experience severe swelling and ecchymosis.

ANTIVENOMS: Antivenom for specific subspecies
Pseudocerastes persicus fieldi must be used.
IRAN: Persica antivenom, Polyspecific *Pseudocerastes persicus*
ROGO: May have antivenom for *P. p. fieldi*


J. Tashjian

Pseudocerastes p. persicus


Pseudocerastes persicus fieldi
Pseudocerastes persicus persicus
USSR
ROMANIA
BULGARIA
GREECE
Black Sea
Caspian Sea
Aral Sea
USSR
TURKEY
CHINA
CYPRUS
SYRIA
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Astola Island
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Red Sea
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Arabian Sea
DJIBOUTI
Gulf of Aden
Socotra Island
ETHIOPIA
SOMALIA
Boundary representations are not necessarily authoritative

Vipera ammodytes

RISK CATEGORY II	(Moderate risk). Frequency of envenomation moderate; venom may be highly toxic.
Common names —	Horned viper, eastern sand viper, Armenian sand viper, sand viper, long-nosed viper
Subspecies —	*Vipera ammodytes meridionalis:* Syria, Turkey.

Distribution/habitat — Found in Syria and Turkey. Usual habitat is dry, rocky terrain, especially slopes facing the sun, and having scattered bushes. Can also be found at elevations between 605 and 1,672 meters.

Identification — Average length, 0.6 to 0.7 meters; maximum length 0.9 meters. Males usually larger than females. Snake most readily identified by snout, terminating in a strongly upturned, horned-like appendage, the anterior surface of which is formed by several small scales, and a crown covered by small scales of irregular size and arrangement. Snake's coloration ash-gray or silver-gray, with bold black dorsal zig-zag. Females tend to be brownish with dark brown zig-zag. Subspecies *Vipera ammodytes meridionalis* males have gray dorsal zig-zag with black edging; females have light brown zig-zag darker brown edging. Head has no distinct markings. Belly yellow to brownish, heavily clouded with dark gray. Eye moderately large, with vertical pupil, and slightly overhung by downward-sloping (rear to front) supraorbital scale.

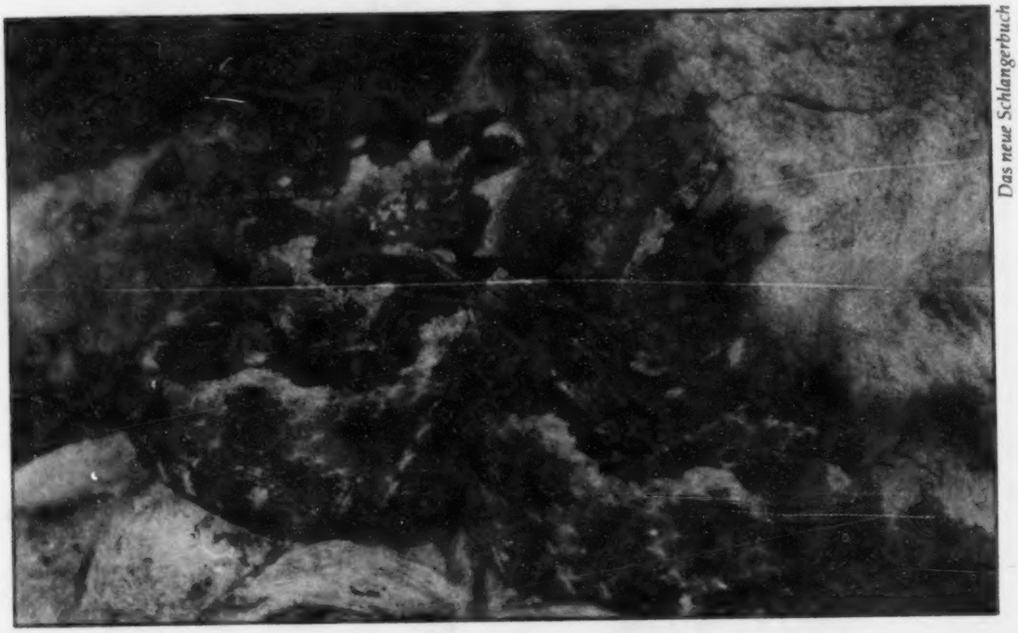
Behavior — Primarily nocturnal, but often seen in open during daytime. Sluggish, normally not aggressive, unlikely to bite unless hurt or handled. In areas where coastal hills and mountains are fringed at low levels by a belt of trees, snakes may migrate to forested area during summer, but spend remainder of year at higher levels among rocks, bushes, or scrubs. Snake's activity more dependent on ambient temperature than on amount of light present. Hibernation is from October to early April in most areas. Mating occurs in late April or in May.

Risk — Venom considered dangerous. Fangs in large specimen may be as long as 0.5 inch, resulting in deep injection of venom. Bite could be very serious, could prove fatal.

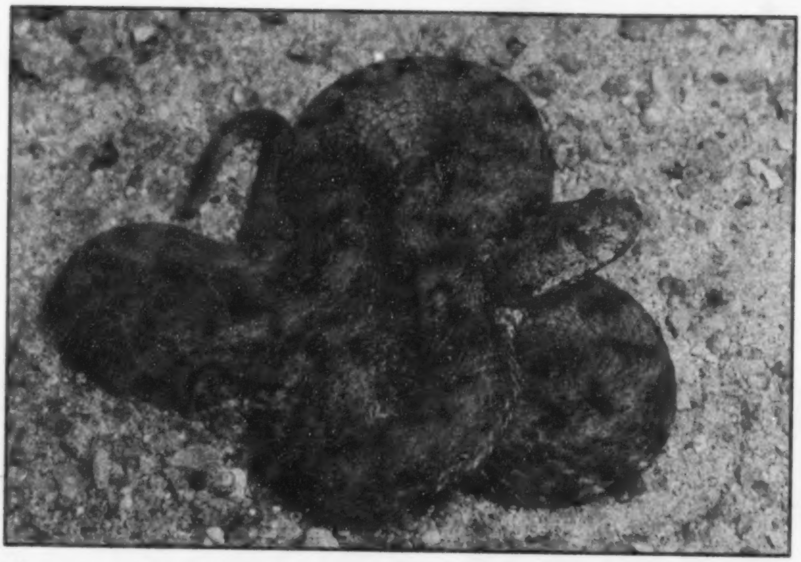
Clinical symptoms —Venom has anticoagulant properties. Symptoms of envenomation include ecchymosis, progressive swelling, lymphedema, shortness of breath, marked limb stiffness, nausea, local hemmorhage; internal bleeding possible. Severe envenomation requires antivenom.

ANTIVENOMS:

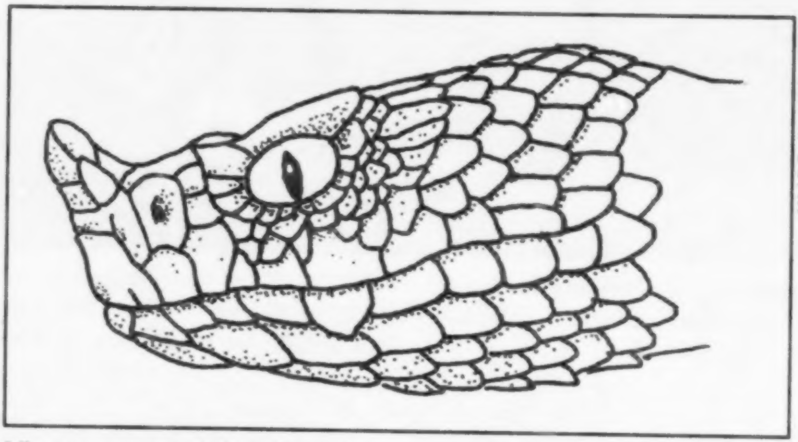
BEHR:	"Europe", "Near and Middle East"
PAST:	"Pasteur Ipser Europe"
SCLA:	"Antiviperin"
CZECH:	"Venise"
YUGO:	"Antiviperinum"
BULG:	*"Vipera ammodytes"*


Das neue Schlangerbuch

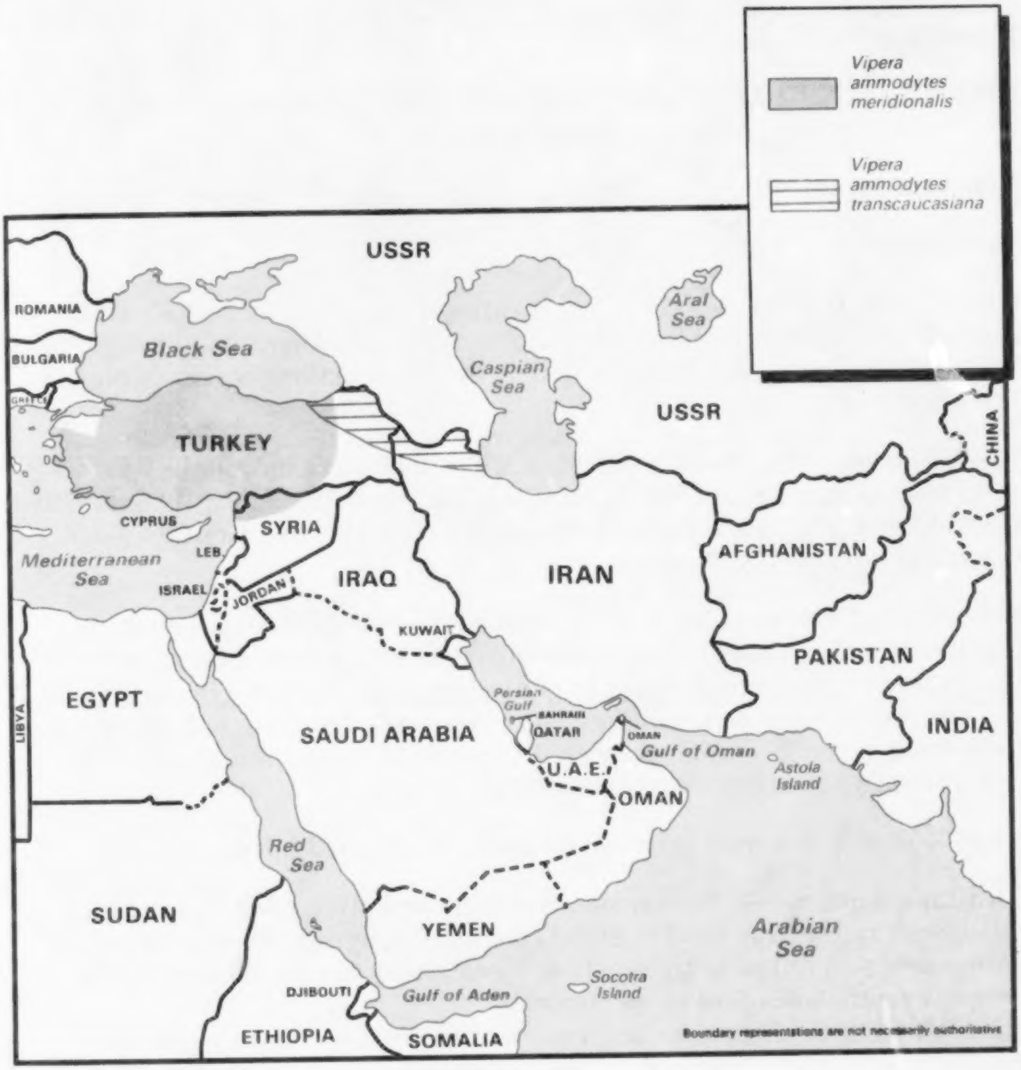
Vipera ammodytes meridionalis


J. Tashjian

Vipera ammodytes transcaucasiana


HMC R. D. Miller, USN

Vipera ammodytes; head



Boundary representations are not necessarily authoritative

Vipera barani

RISK CATEGORY IV (Minor risk). Frequency of envenomation low; venom mildly toxic.

Common name — None

Subspecies — None

Distribution/habitat — Found in hilly areas at about 400 meters elevation in northwest Turkey near Black Sea. Habitats include forest, woodland, cropland, grazing areas. May be more widely distributed along southern part of Black Sea.

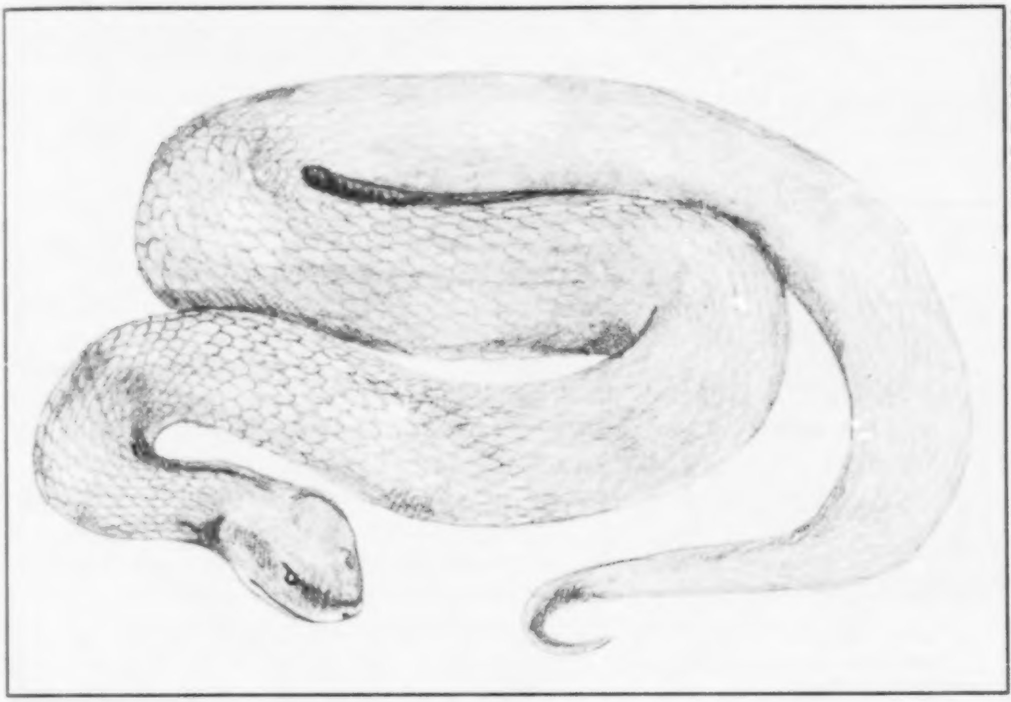
Identification — Body stout, slightly flattened. Head ovoid, slightly broadened toward rear. Snout broadly rounded, slightly overhanging. Length may reach 0.5 meters. Coloration uniform black with white area around lip. Underside of tail bright yellow.

Behavior — During cooler months, most active mainly during day; during warmer months primarily largely nocturnal. In cold weather, basks in the sun; retreats to cover in evening. In hot weather, can be found beneath plant growth. Assumed to be nonaggressive; but is easily alarmed, will bite if frightened or stepped upon. Reportedly unable to strike more than 0.2 meters upwards hence thick boots provide protection.

Risk — Venom assumed to be mildly toxic; no reported bites.

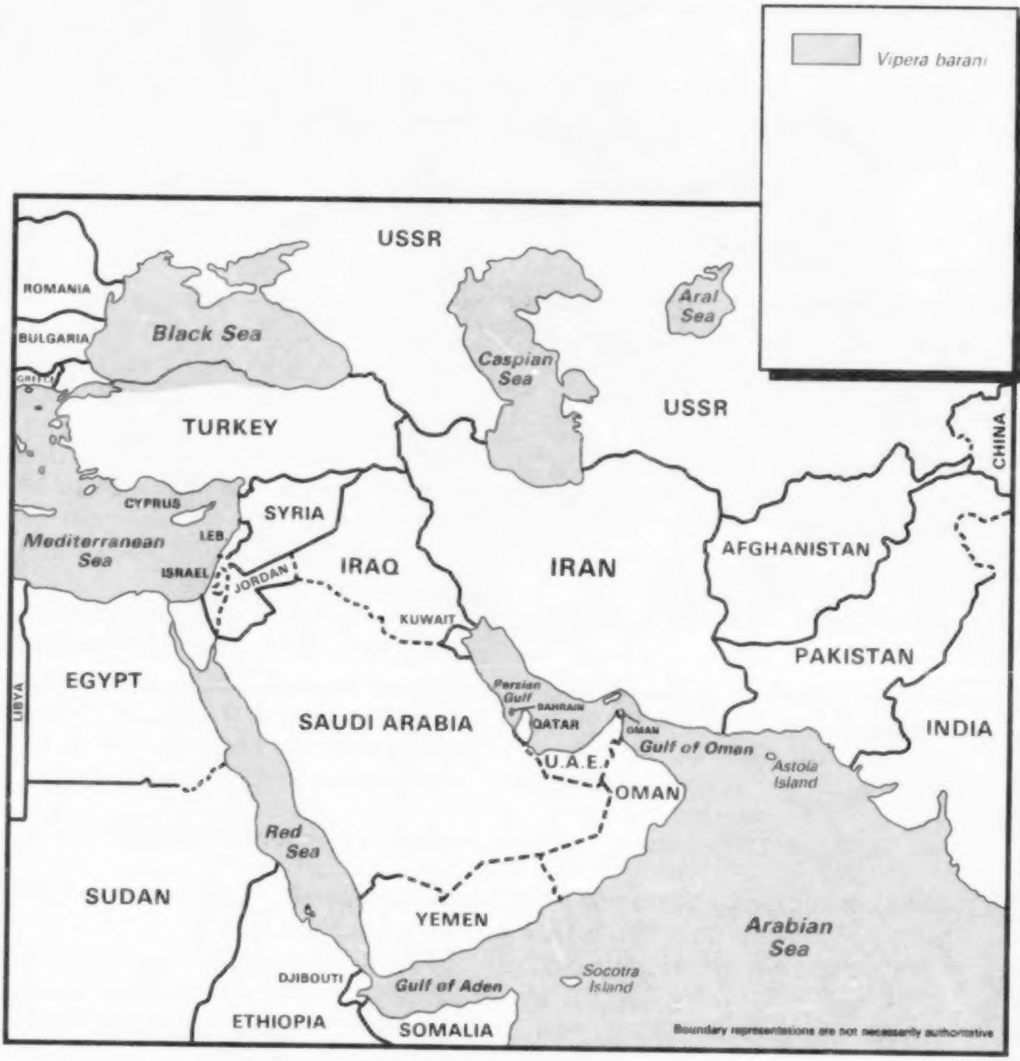
Clinical symptoms — Venom assumed to be hemolytic (destroys red blood cells), with factors that modify blood coagulation. Symptoms would include pain at bite site, followed by swelling, discoloration, internal bleeding. Severe envenomation could cause shock.

ANTIVENOMS: Specific antivenom not available. Possibly effective:
PAST: "Isper V", "Isper Europe"
BEHR: "Europe"
Also possibly effective:
SCLA: "Antiviperin"
CZECH: "Venise"



HMC R. D. Miller, USN

Vipera barani


Vipera barani
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Vipera kaznakovi

RISK CATEGORY III (Minor risk). Frequency of envenomation low; venom may be moderately to mildly toxic.

Common names — Caucasus viper, Kaznakov's viper

Subspecies — None

Distribution/habitat — Found in Turkey, northwestern Iran. Found primarily in wooded hillsides and meadows at elevations up to 1,800 meters.

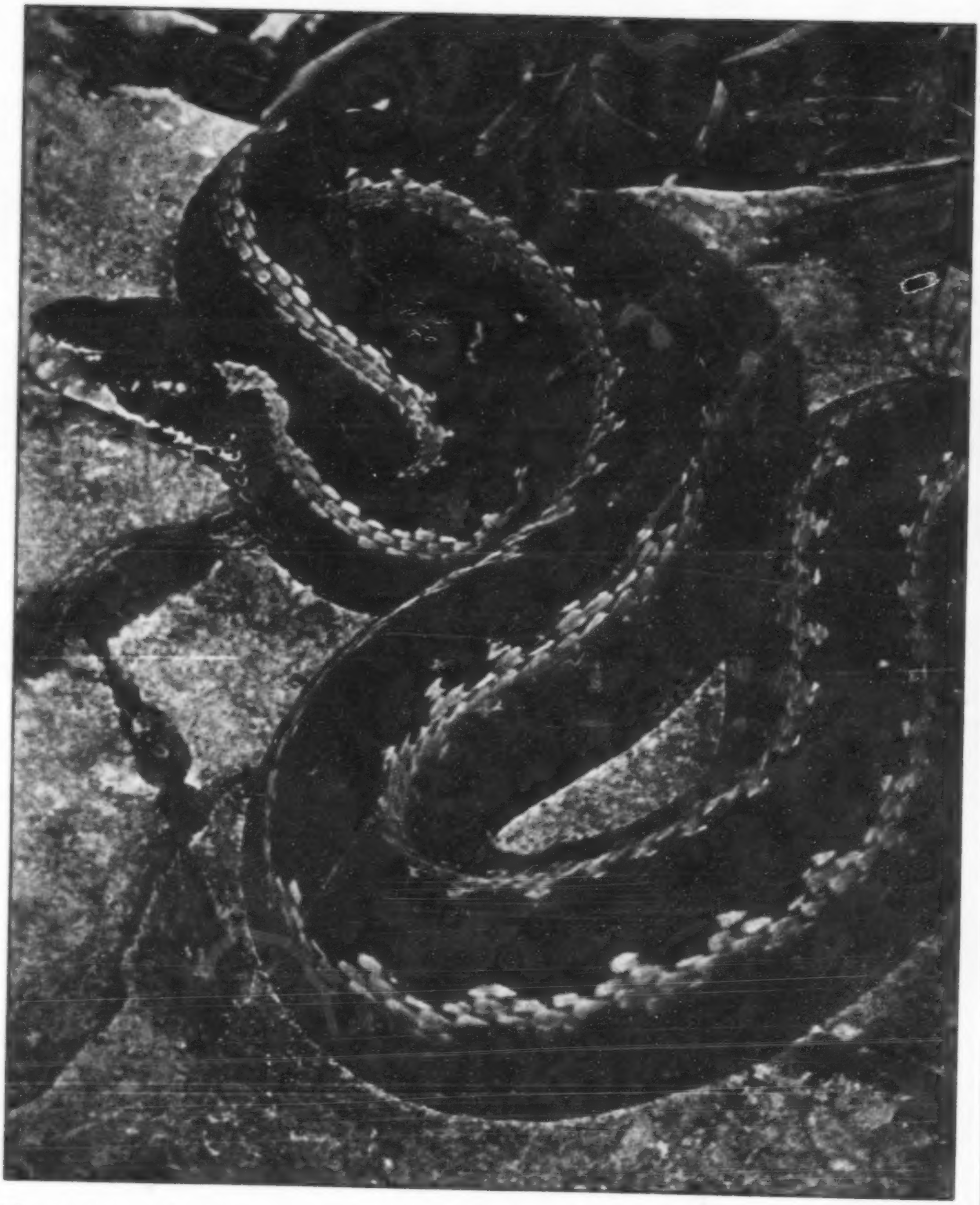
Identification — Small, rather stout. Average length, 0.4 to 0.5 meters; can reach maximum length of 0.7 meters. Similar in size, appearance to *Vipera ursinii*, but somewhat thicker. Head short, broad, triangular, is distinct from neck. Snout rounded, nose horn absent. Eyes have vertical pupils. A black line extends backwards from each eye to corner of mouth, continues to side of neck. Two converging lines on top of head form V-mark with vertex between eyes. Dark-edged rectangular dark blotches, often joining to form zigzag line, extend from head to tail down middle of back. Each flank has two rows of dark spots, usually alternating; spots often are enlarged, indistinct. Dorsal ground color variable, ranging from light yellow, to brownish, to dark red. Completely black specimens sometimes found. Some specimens have additional row of light spots on lower flank.

Behavior — Behavior not well characterized, but probably similar to that of *Vipera ammodytes*. Not aggressive; will avoid confrontation when possible. Will bite if persistently disturbed or if hurt.

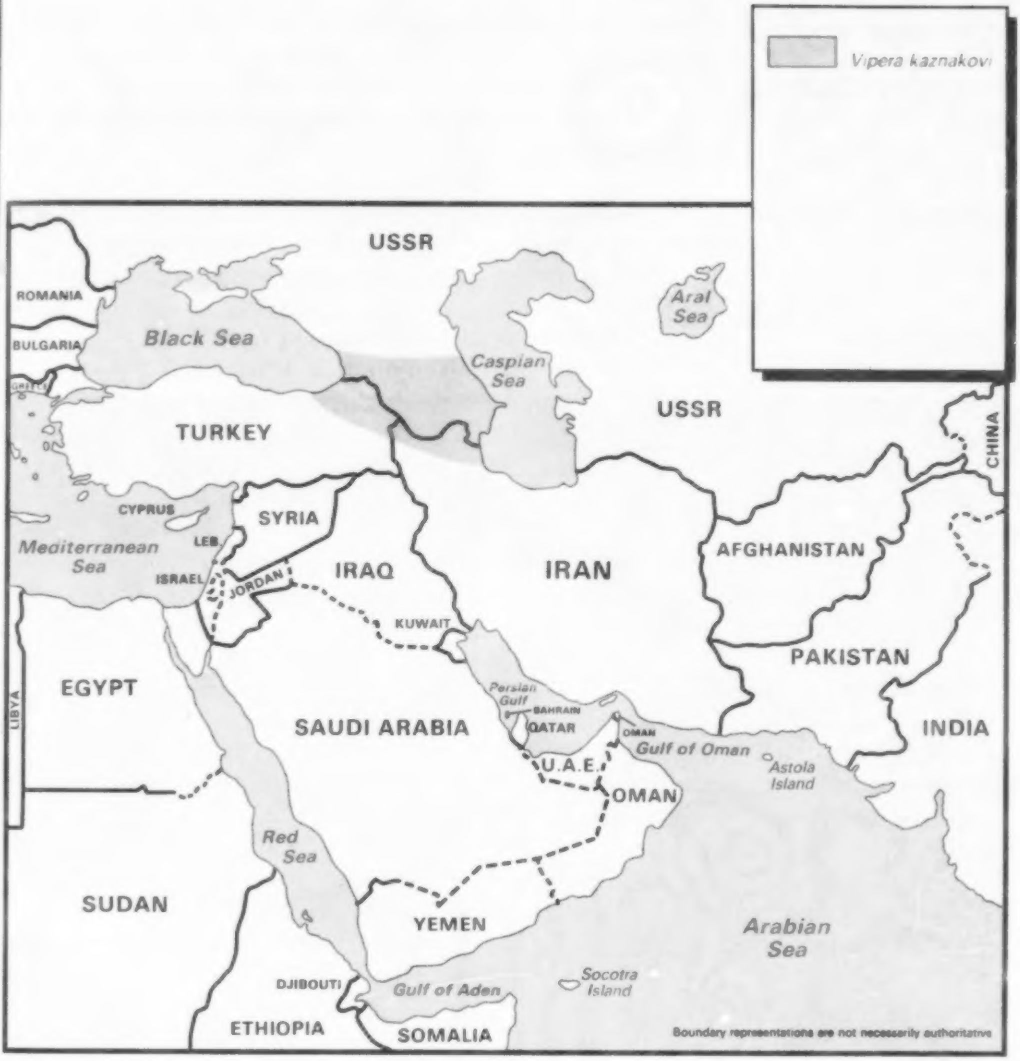
Risk — Venom moderately toxic. Venom yield small. Human, livestock fatalities have been recorded.

Clinical symptoms — Venom hemolytic, with factors that modify blood coagulation. Envenomation causes pain at bite site, followed by swelling, discoloration, internal bleeding. Severe envenomation can cause shock.

ANTIVENOMS:
BEHR: "Europe"
SCLA: "Antiverpin"



Vipera kaznakovi


Vipera kaznakovi
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Vipera lebetina

RISK CATEGORY II (Moderate risk). Frequency of envenomation high; toxicity of venom moderately high, to high.

Common names — Levantine viper, mountain adder, desert adder, blunt-nosed viper or Kufi, Levant viper, Levantine adder, Levative viper, true adder

Subspecies —
Vipera lebetina lebetina (Cyprus)
Vipera lebetina euphratica (Iraq, Iran)
Vipera lebetina obtusa (Iran, Pakistan, Afghanistan, Syria, Israel, Lebanon)
Vipera lebetina turanica (Iran, Afghanistan, Pakistan)

Distribution/habitat — Found throughout most of Asia Minor and east to Pakistan. Found mostly in dry, rocky, mountainous areas between 1,000 and 2,200 meters elevation.

Identification — Large, up to 1.6 meters long; females larger than males. Has no horn, no shields; fangs very large. Scale pattern consists of rosettes with light centers; intensity of margination may merge into wavy band, lateral spots more distinct than dorsal patterns. Coloration is gray, gray-brown, or yellowish with gray underside in females. Tail pinkish brown, tapers abruptly.

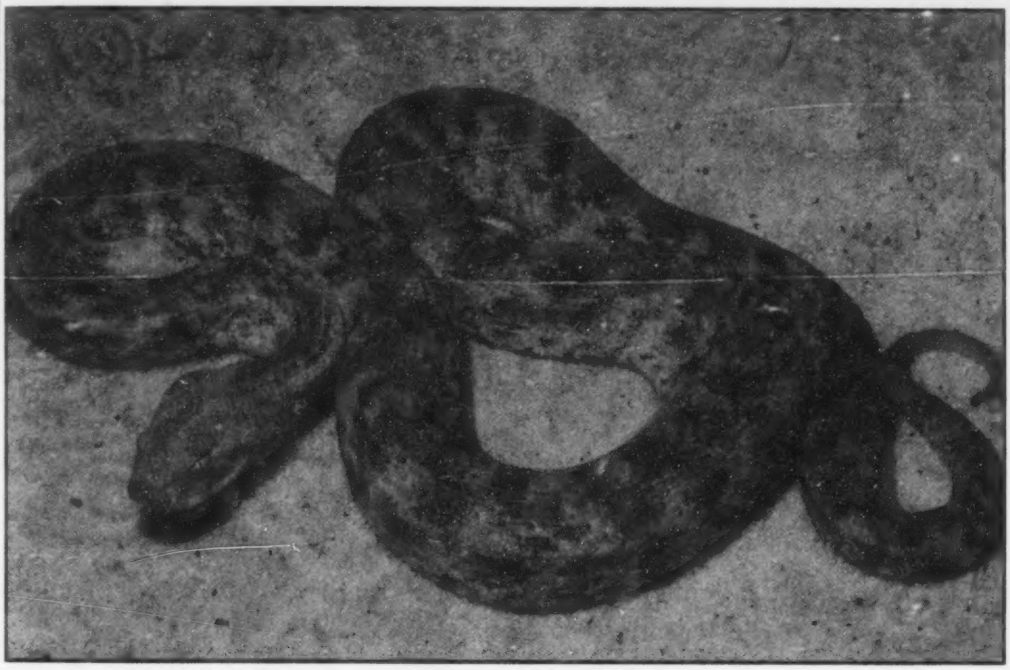
Behavior — Normally placid during day, but quite alert and will strike quickly. Occasionally aggressive at night. Terrestrial, but can be found in bushes.

Risk — Risk to man high. A dangerous snake of major medical importance.

Clinical symptoms —Venom contains anticoagulant and procoagulant properties, proteolytic enzymes, L-amino oxidase, phospholipase, coagulation accelerator, coagulation inhibitor. Clinical signs/symptoms include free bleeding from punctures, immediate local burning pain. Swelling occurs promptly around bite site, spreads centrally. Swelling often accompanied by discoloration of skin and ecchymosis. Blood-filled or serum-filled vesicles appear within a few hours. Early systemic symptoms also include weakness, faintness, sweating, thirst, nausea, vomiting; frequently, diarrhea. Pain along lymphatics, swelling of regional lymph nodes occurs later.

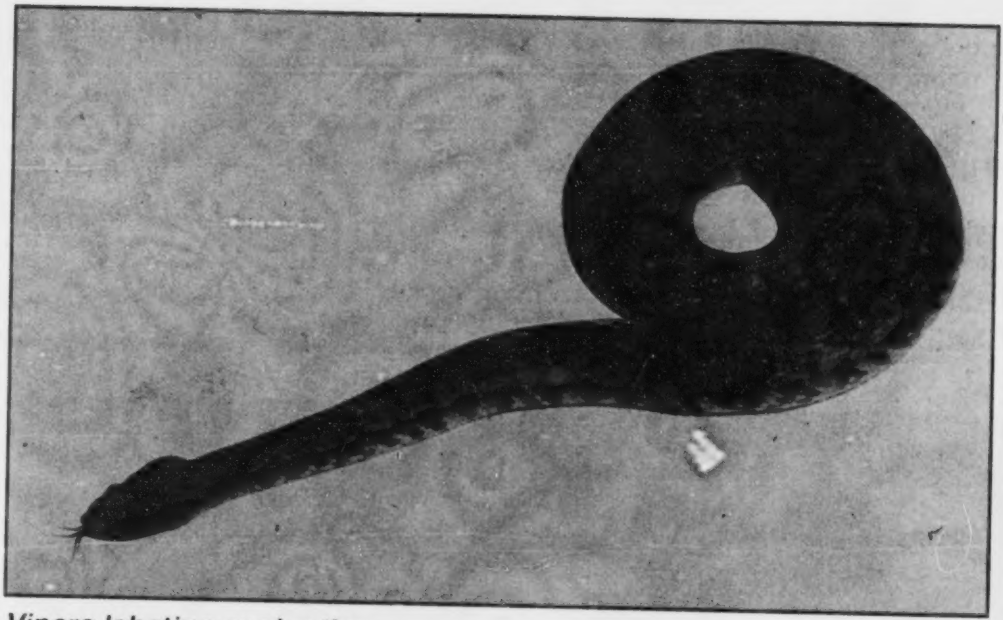
ANTIVENOMS:

BEHR:	"Europe", "Near and Middle East", "North and West Africa"
TASH:	"Monovalent *Vipera lebetina*", "Polyvalent"
PAST-ALG:	"Antiviperin"
IRAN:	"Monospecific *Vipera lebetina*"
PAST:	"Antirept Pasteur", "Near and Middle East"



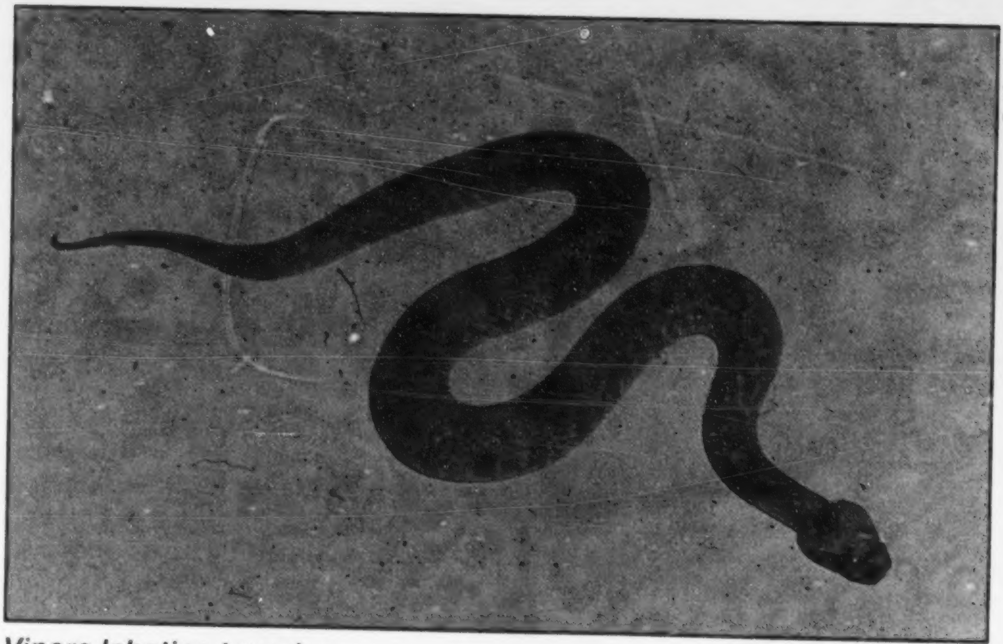
I. Tashjian

Vipera lebetina obtusa



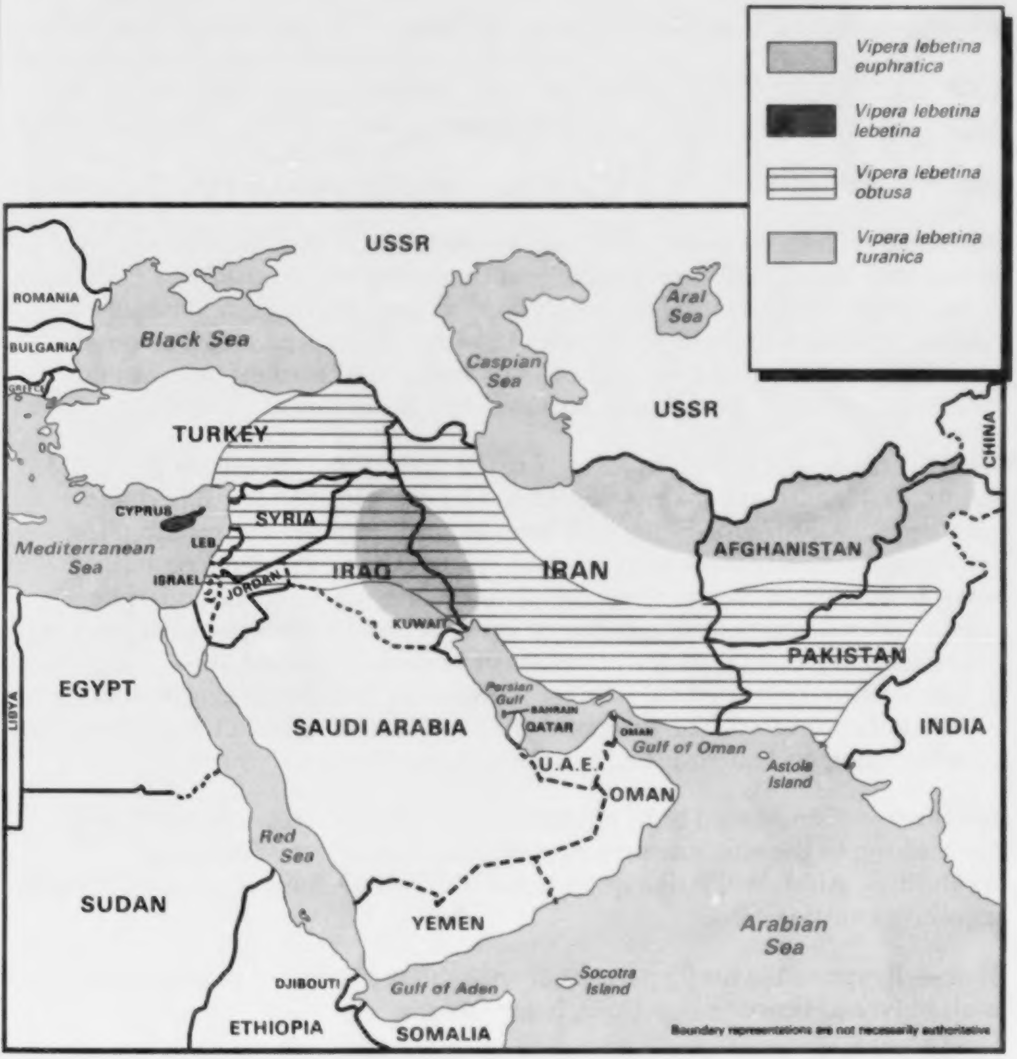
R. Newburn

Vipera lebetina euphratica



R. Newburn

Vipera lebetina turanica


Vipera lebetina euphratica
Vipera lebetina lebetina
Vipera lebetina obtusa
Vipera lebetina turanica
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Socotra Island
ETHIOPIA
SOMALIA
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Vipera palaestinae

RISK CATEGORY I (High risk). Frequency of envenomation high, venom highly toxic.

Common names — Palestine viper, Palestinian viper

Distribution/habitat — Found along Mediterranean coastal plains throughout Israel, Lebanon; Jordan and bordering regions of Syria from the Golan Heights south to the Egyptian border; west to Amman. Basically a lowland species which inhabits rocky hillsides, cultivated areas, covered growth areas. Not found in sandy, desert regions. Abundant near human dwellings where its food (birds, and rodents) is plentiful.

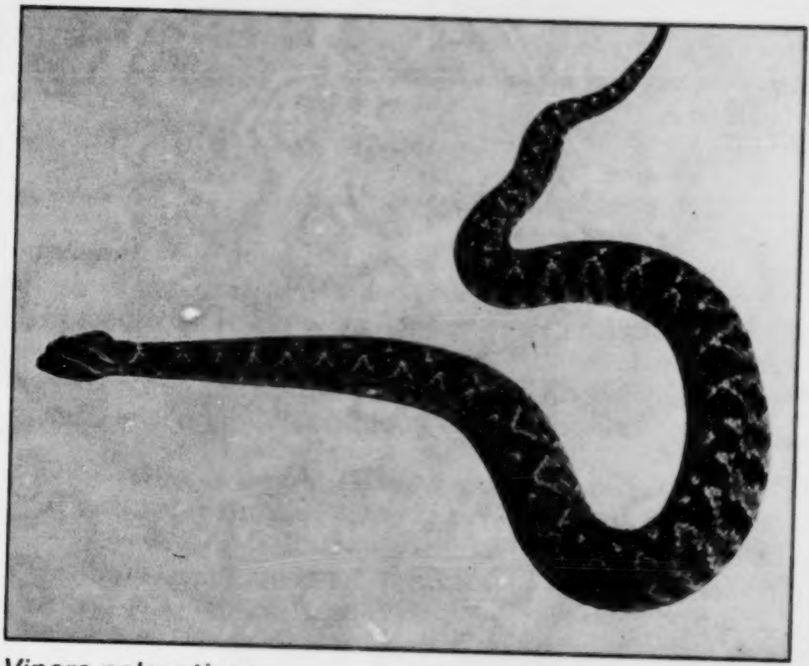
Identification — Average length, 0.7 to 0.9 meters; may reach length of 1.3 meters. Tail length approximately 8.5 to 11.1 cm. Head triangular, distinct from neck. Two brownish-blackish lines extend from eyes to mouth. First line drops vertically from eye to mouth, second line extends diagonally down from eyes to corner of mouth. Two oblong markings on top of head form a V with vertex falling between eyes. Ground color brownish-gray or yellowish-gray. Dorsal pattern consists of brown connected diamonds. Similar diamond-shaped side dorsal patterns extend down length of body, but are not connected. The diamond shaped areas are distinct, bordered with a darker color, and surrounded by a bright, narrow line.

Behavior — Considered to be nocturnal, but may be encountered during day basking in the sun, amidst vegetation, in marsh areas. Arboreal capabilities. Alert, will strike quickly if disturbed. Defensive attitude consists of coiling emitting hiss.

Risk — Responsible for 95 percent of snakebites (5 percent of which are fatal) in Israel. Venom neurotoxic, hemorrhagic.

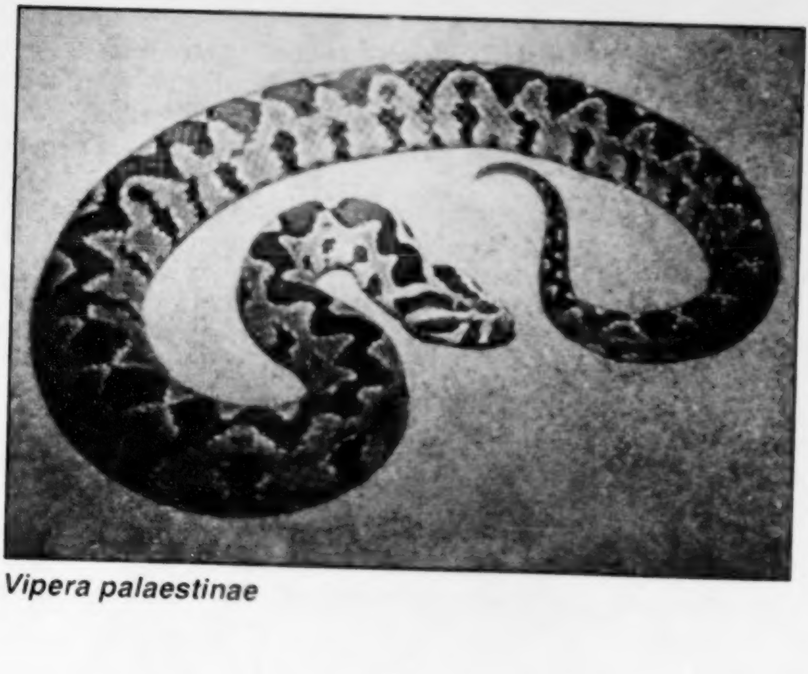
Clinical symptoms — Symptoms include local swelling, which may spread within a few hours; hemorrhagic or serous blisters at bite area; regional lymphadenitis (swelling of lymphs). Severe envenomation causes nausea, vomiting, abdominal pain, diarrhea, peripheral shock, gastrointestinal disturbances, severe dehydration, swelling of lips and face, fever, internal hemorrhages which cause blood clots. In some patients, delayed shock may develop suddenly after 1 week of apparent recovery. The patient becomes restless, sweats profusely, respiration becomes rapid, temperature rises, tachycardia develops, blood pressure falls to shock levels, renewed edema spreads from bite area new subcutaneous hemorrhages occur. Patient may recover after a relatively long interval, but some patients die within a few hours to 2 days after onset of delayed shock.

ANTIVENOM:
ROGO: "Palestine Viper"
IRAN: "Poly-specific"



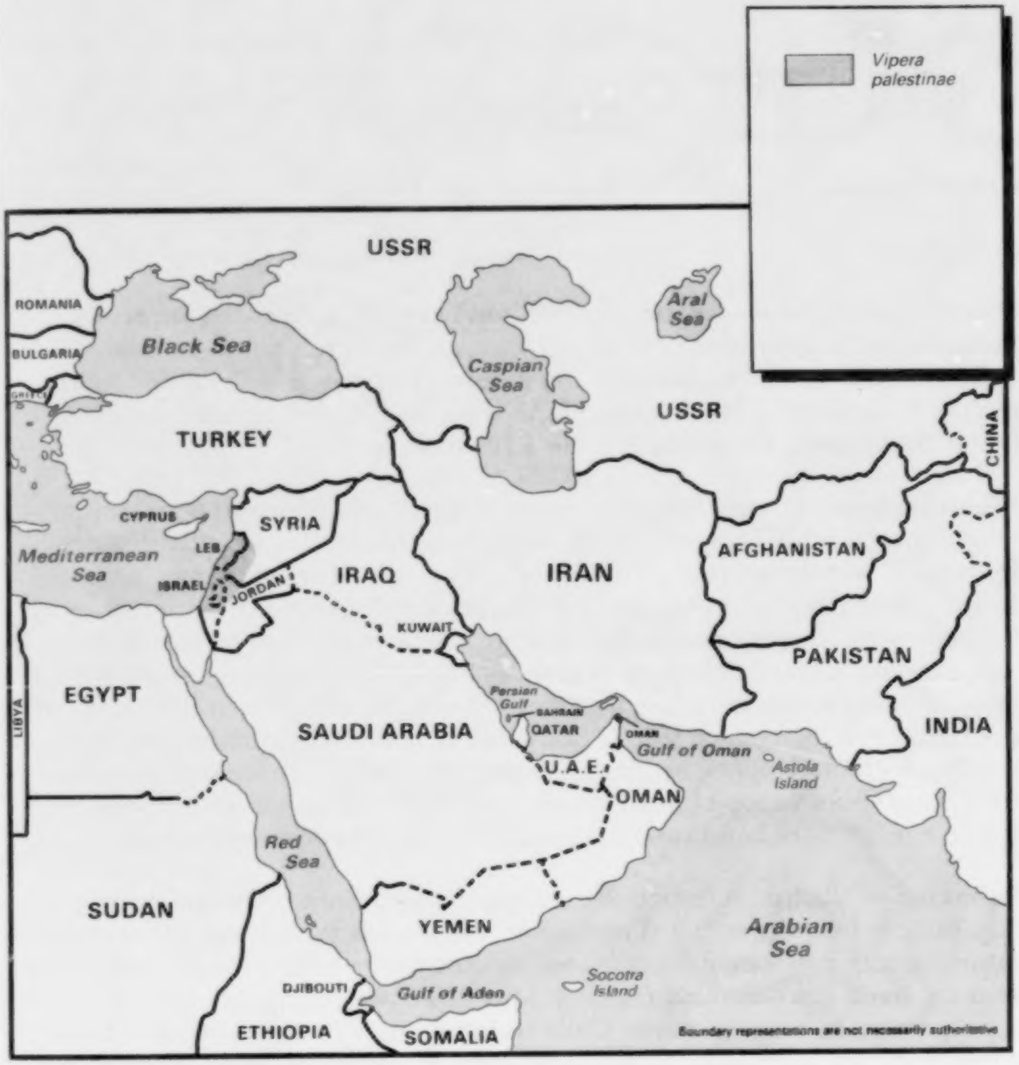
R. Newburn

Vipera palaestinae



I. Tashjian

Vipera palaestinae


▨ Vipera palestinae
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ETHIOPIA
SOMALIA
Boundary representations are not necessarily authoritative

Vipera russelli

RISK CATEGORY I (High risk). Frequency of envenomation high; venom highly toxic

Common name — Russell's Viper, Daboia

Subspecies — *Vipera russelli russelli*

Distribution/habitat — Found in Pakistan from India-Pakistan border to Indus Valley in provinces of Sind and Punjab, and throughout southeast Asia. Habitat varies; not found in dense forest or permanent marsh. Occurs in plains, savannahs, foothills montane areas (moist, cool upland slopes below timberline) at elevations up to 2,200 meters.

Identification — Large, robust; average length 0.7 to 1.3 meters; maximum length may reach 1.7 meters. Head rather long, triangular, slightly distinct from neck, with large, conspicuous nostrils on side of snout. Fangs large, tail short. Ground color may be dark brown, brownish-yellow, or brownish-gray. Immature specimens usually clear orange to brownish-orange. Dorsal pattern consists of black or brown oval spots edged with black, white, or both. Spots in middle row may fuse together to form zig-zag pattern. Two rows of oval spots run along each side of body. Tail striped. Belly pinkish-brown or whitish with black spots; becoming darker toward tail. Three separate semi-triangular spots on top of head are situated to form triangle with vertex between eyes. A dark band runs diagonally from eye to corner of mouth.

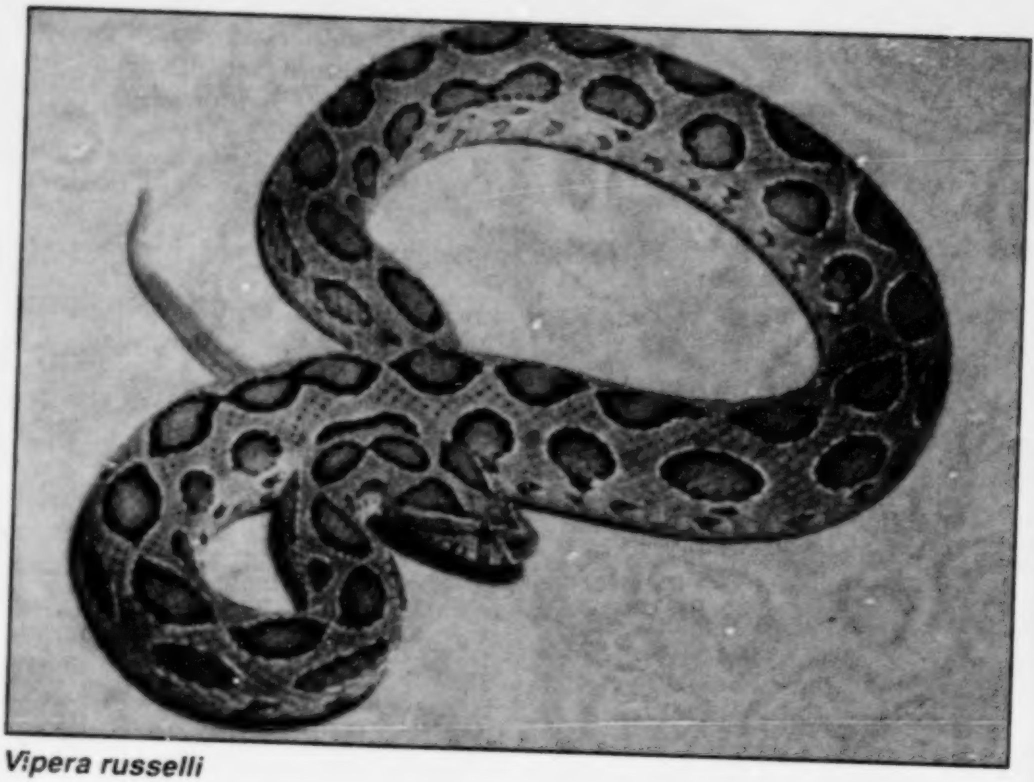
Behavior — Nocturnal (especially during hot weather). Lethargic during day, but can be quite active at night. Shelters in rodent burrows, old termite mounds, rock crevices, piles of leaves, or other debris. Also found near human dwellings searching for prey. May be active during day in cool weather. Can be very excitable. Coils and will hiss when disturbed. When excited, body will vibrate and emit a low rasping sound resulting from scales of one part of coiled body rubbing upon another. Generally strikes only at objects within its effective striking range; may strike quickly without provocation.

Risk — Venom highly toxic; causes most of the snakebite fatalities in the areas where it occurs. Can deliver 2 to 3 times the lethal venom dose.

Clinical symptoms — Venom neurotoxic, hemotoxic, but primarily affects blood coagulation. Symptoms include local swelling; pain, and bleeding at the bite site; painful, enlarged regional lymph nodes; bleeding distant from bite site (e.g., the gums); vomiting; drowsiness; abdominal pain; blood pressure drop; kidney tenderness and failure. Minor symptoms include dizziness, loin pain, bleeding from puncture wounds, necrosis, hemorrhaging.

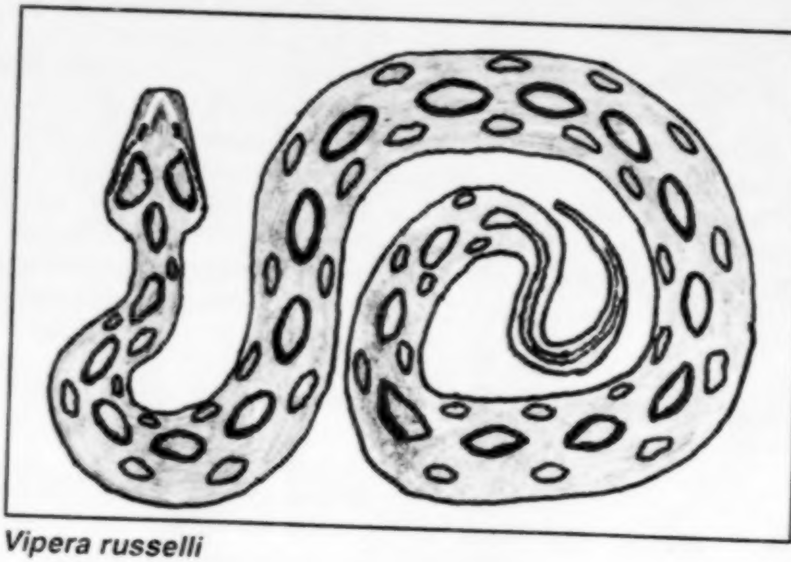
ANTIVENOMS:

HAFF: "Vipera"
RANG: "Bivalent", "Russell's Viper"
KASA: "Polyvalent"
THAI: "Russell's Viper"
NIH: "Anti-snake Venom Serum"
"Polyvalent"
"Russell's Viper Monovalent"



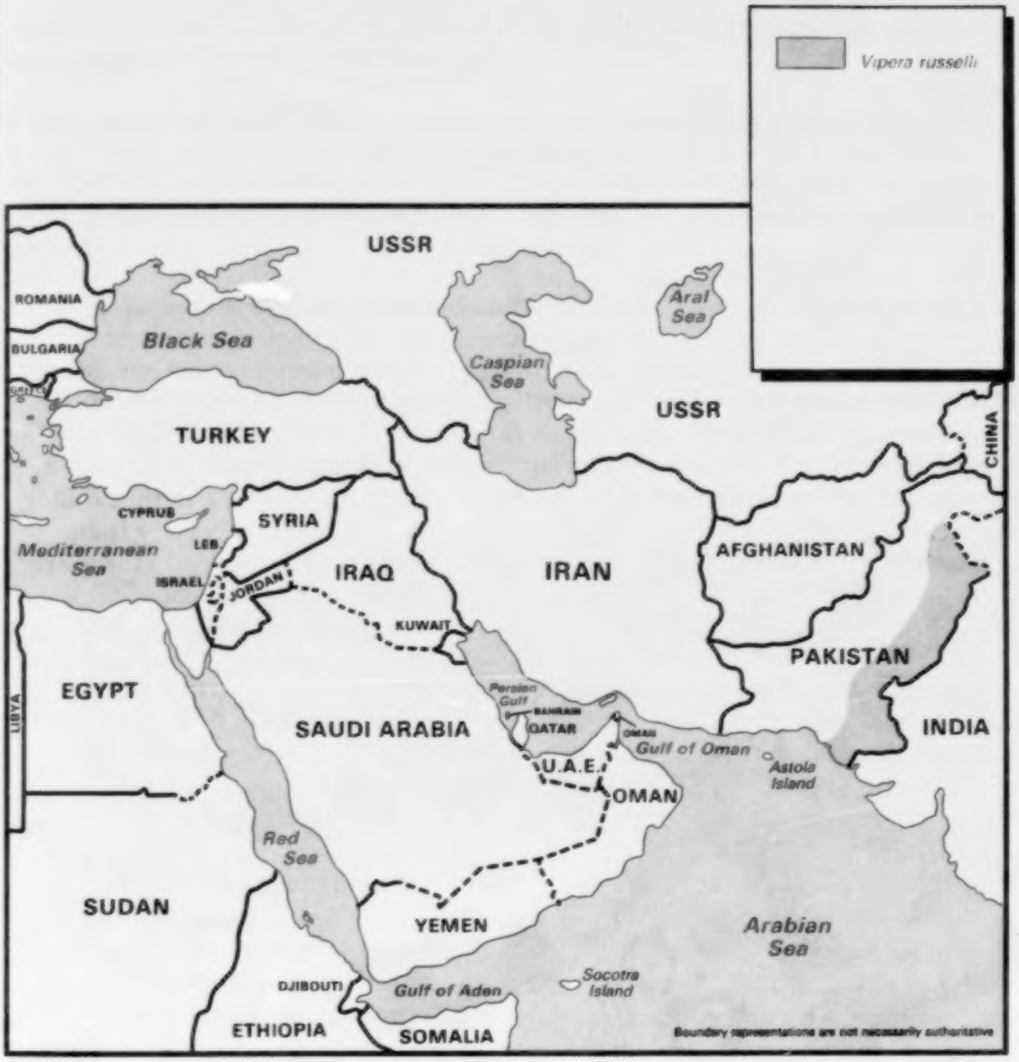
J. Tashjian

Vipera russelli



HMC R. D. Miller, USN

Vipera russelli


▨ Vipera russelli
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Boundary representations are not necessarily authoritative

Vipera ursinii

RISK CATEGORY IV	(Little risk). Frequency of envenomation low; venom slightly toxic.
Common names —	Meadow viper, field adder, Orsini's viper, steppe viper
Subspecies —	*Vipera ursinii ursinii, Vipera ursinii renardi* (steppe viper)

Distribution/habitat — Found in northern Iran, northern Turkey within 50 km of Soviet border. Over much of its range, found in dry plains, flatlands with few trees or bushes; more common when these conditions occur at somewhat higher elevations. Also found in woods on hillsides, in mountainous regions. In Iran's Alburz Mountains, found at elevations greater than 2,700 meters. At lower elevations, found in moist low-lying grasslands, even in marshes. Generally seeks open areas near dry clay or loamy soil. Hides in rodent dens, small animal burrows, often uses them for hibernation.

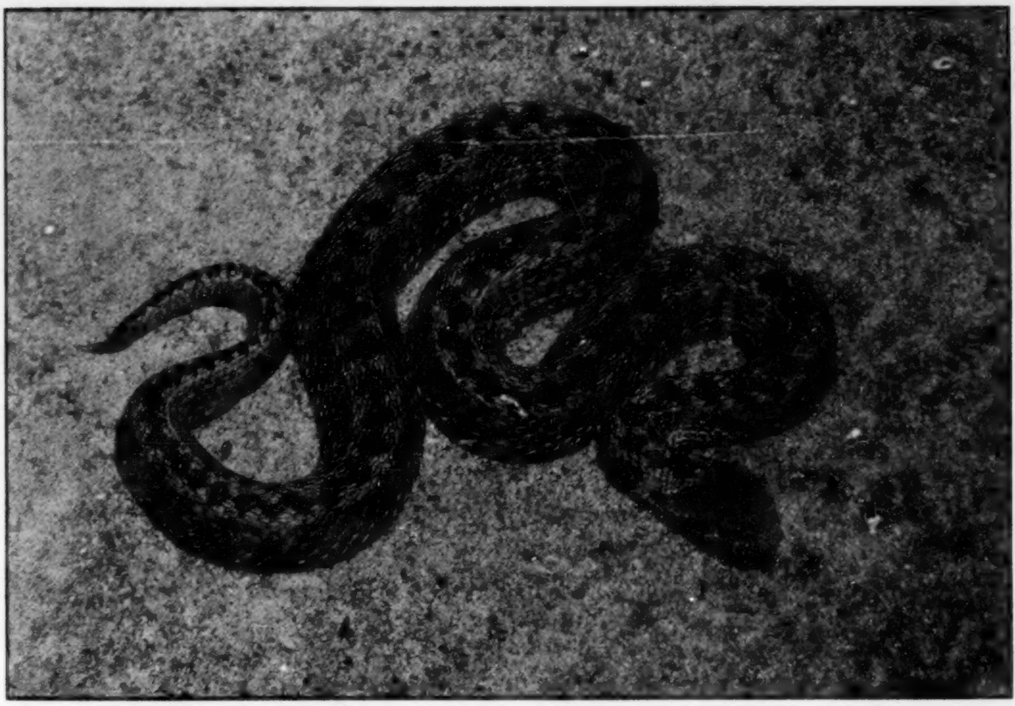
Identification — Small, moderately thick bodies, average length 0.4 to 0.5 meters, maximum length 0.65 meters. Females larger than males. Head oval, narrower than that of other vipers, but distinct from neck. Snout rounded, slightly upturned. Crown covered by five large scales. Eyes small, pupils vertical. Tail short; comprises about one-tenth of snake's length. A dark line extends from each eye backwards to corner of mouth. On top of head, two or four lines converge just behind eyes. From head to tail, down center of back, is a dark, wavy, zig-zag line with black edges, sometimes discontinuous, forming a series of blotches. There are two alternating rows of dark spots on each flank, with spots of upper row usually opposite indentations of dorsal stripe. Flanks are darker than back. Coloration not as variable as in other viper species. Dorsal ground color can be gray, yellowish, greenish, or light brown. Belly usually light gray or dark gray, sometimes with small dark spots. Underside of tail tip dark gray, sometimes with yellow markings. Completely black specimens have been found. Color pattern of young more striking than that of adults.

Behavior — Hibernates during winter months, emerges from approximately March through October. Snakes probably hibernate in colonies, emerge in large numbers in the spring. Primarily diurnal, but can be nocturnal during hot summer months. More active than other vipers, can move rapidly. Not aggressive disposition is considered gentle avoids human confrontation. Seldom bites humans, even when bothered, but will bite if continuously disturbed, stepped on, or handled roughly.

Risk —The least dangerous venomous snake in southwestern Asia. Docile, rarely bites (usually only when trodden upon or mistaken for a nonpoisonous snake). Venom is least toxic of all vipers in southwestern Asia; because of its small size, venom yield is small. No recorded cases of human fatalities from its bite.

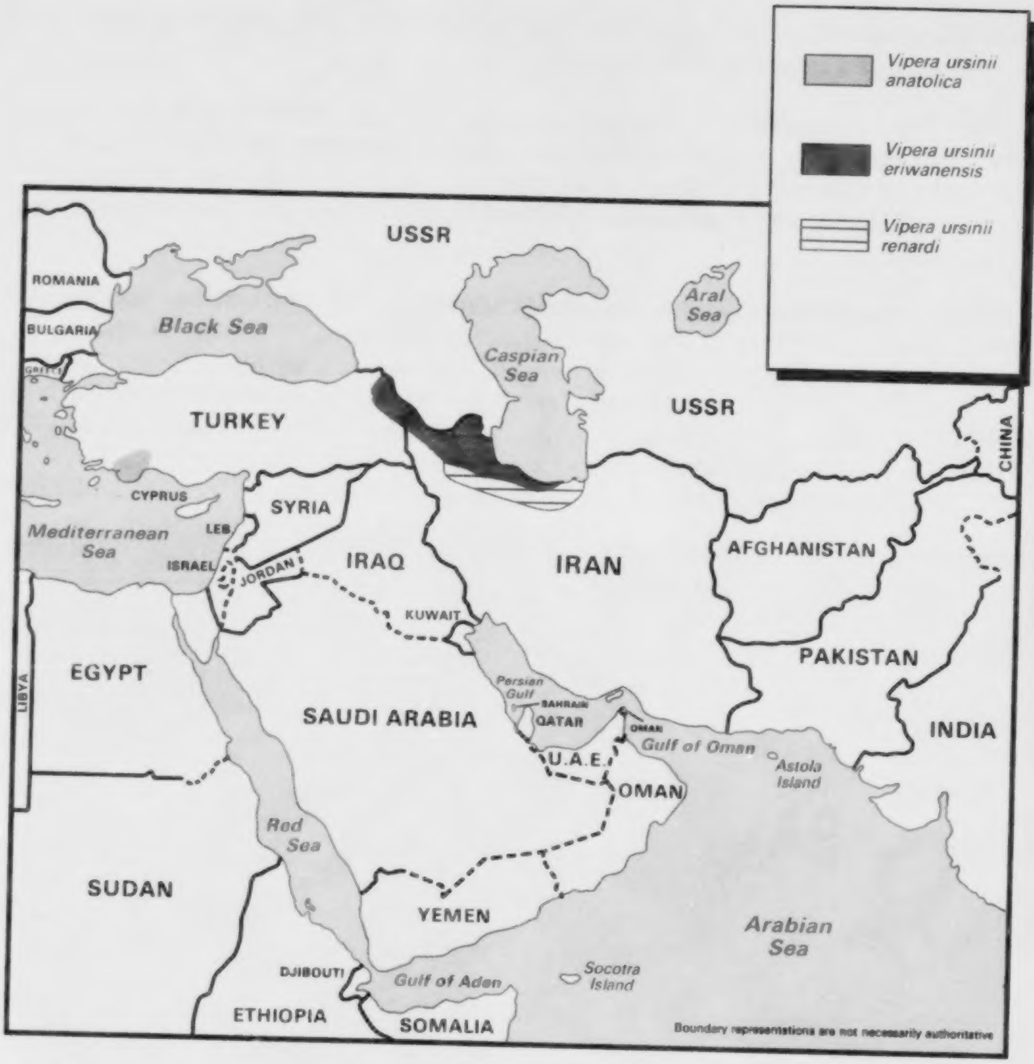
Clinical symptoms —Venom somewhat hemolytic. Envenomation causes local pain and swelling of the immediate area, followed by dizziness and sickness; recovery usually relatively rapid, without serious aftereffects.

ANTIVENOMS:
SCLA: "Antiviperin"



J. Tashjian

Vipera ursinii eriwanensis


Vipera ursinii anatolica
Vipera ursinii eriwanensis
Vipera ursinii renardi
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Socotra Island
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Vipera xanthina complex

RISK CATEGORY IV (Little risk). Frequency of envenomation low; venom may be highly toxic

Species groups —

Vipera xanthina species group
Vipera xanthina
Vipera bulgardaghica
Vipera bornmuelleri
Vipera wagneri

Vipera raddei species group
Vipera raddei
Viper allatifii
Vipera albicornuta

Species/common names —
Vipera xanthina: Ottoman Viper, Near East Viper, Turkish Viper
Vipera bulgardaghica: Bulgar Dagh viper, Cilician viper, Cilicia bornmuelleri (Cilicishe bornmuelleri)
Vipera bornmuelleri: Bornmueller's Viper, Lebanese dwarf viper, Lebanon adder, Hermon viper
Vipera wagneri: Wagner's viper, Urmia viper
Vipera raddei: Radde's rock viper
Vipera latifii: Latifi viper
Vipera albicornuta: No common name

Subspecies — *Vipera raddei raddei, Vipera raddei kurdistanica*

Distribution/habitat —*Vipera xanthina*: restricted to Mediterranean area, specifically the Caucasus Mountains of northwestern Turkey. Occurs along stream valleys, other moist, vegetated places. Absent from true desert; often plentiful in cultivated regions. Reportedly present on island of Cyprus. *Vipera Bulgardaghica*: found in south central Turkey, specifically the Taurus Mountains. Habitat consists of open thorn-cushion formations, grasslands. Found in high mountain rocks, talus slopes (loose rocks at base of hill), at elevations of 2,100 to 2,700 meters. *Vipera bornmuelleri*: found on Mount Hermon on the border between Lebanon and Syria; southward through the Lebanese Mountains to conjunction of Lebanon, Syria, and Israel borders. Occurs in high, snowy mountains of Lebanon and adjacent areas of Israel and Syria at elevations greater than 1,600 meters. Found on western slopes of Lebanon Mountains. Also found in cedar forests, grasslands. *Vipera wagneri*: thought to occur in the high plateau and mountain ranges of Azerbaijan, Iran. Presumed to be limited to rocky regions. *Vipera raddei*: found in eastern

Turkey (including Armenian region), northwestern Iran. Habitat consists of rocky terrain having sparse growth of oaks and bushes among rock fragments. Also found in cultivated areas at elevations of 1,100 to 2,400 meters. *Vipera latifii*: found in the Lar Valley of the Alburz Mountains located northeast of Tehran, Iran, in well-drained, sparsely-vegetated rock habitats along the steep sides of valley at elevations of 2,800 to 2,900 meters. *Vipera albicornuta*: found in the Alburz Mountains, the mountains surrounding Zanjan valley, the northern parts of the Zagros mountains of northern and western Iran. Habitat is sandy, dry regions with sparse grass and vegetation.

Identification —

Chart I

Vipera xanthina *group*	***Vipera raddel*** *group*
Supraocular in broad contact with eye	Supraocular separated from eye
Supraocular plates not angled	Supraocular plates are angled and raised
Body is stout	Body is relatively slender
Longer tail normally (8% or more)	Shorter tail normally (8% or less)
General Characteristics	
Head is broad, triangular and distinct from neck	Head is broad, triangular and distinct from neck

Vipera xanthina: average length 0.7 to 0.95 meters, maximum length 1.3 meters. Eye has vertical pupil, golden iris. Males more boldly marked than females, with bold black zig-zag or blotched dorsal surface on bright gray ground color. Female tends to be more brownish. *Vipera bulgardaghica*: small, does not exceed 0.6 meters in length. No obvious sexual color dimorphism. Ground color brownish-gray with blackish dorsal patterns belly grayish, tail red. Dorsal patten consists of alternating rectangular blotches with pronounced transverse bridle over snout. Neck pattern consists of two black, oblique, isolated blotches; belly pattern consists of finely dotted or weakly developed dark spots. Throat whitish. *Vipera bornmuelleri:* average length less than 0.5 meters, maximum length 0.8 meters. Can be brownish gray with indistinct darker spots or smokey gray with or without darker gray cross-spots or dark cross-bands. Toward rear, cross-bands often merge, forming an indistinct zig-zag band. Underside usually finely speckled. *Vipera wagneri*: length (based on one female specimen) 0.29 meters; tail 0.02 meters

(7.2 percent of total length). Ground color grayish. Dorsal pattern consists of yellowish-brown round blotches with dark borders on front and back. There are two isolated oblique spots on neck and a dark narrow line from eye to corner of mouth. Scales around lips and sides of head light in color. Belly whitish-gray with irregularly dispatched yellowish brown blotches. *Vipera raddei:* maximum length of male is 1.0 meters, of female, 0.8 meters. No sexual dimorphism. Ground color grayish-brown, brownish-gray, grayish-black, or blackish. Dorsal pattern may be connected to form zig-zag band. In northern specimens, dorsal pattern consists of isolated roundish blotches, sometimes dark-edged. Blotches are yellow, yellowish-orange, brown-orange, or reddish. Southern specimens have ground color lighter than dorsal pattern. side of body has black-gray or black-edged spots, often scattered. Belly blackish. Neck pattern may consist of two diagonal of L-shaped black spots that may be united with dorsal pattern on body. Neck pattern may be absent. Tail yellowish-orange. *Vipera latifii*: maximum length of 0.8 meters. Males slightly larger than females. There are four different color variations, each with distinct dorsal patterns, but no sexual dimorphism. Brownish gray color has distinct, well-developed zig-zag pattern. Yellowish-gray color has prevalent spots or blotches, somewhat darker than ground color. Grayish or brownish color has dark, narrow vertebral stripe, or will be patternless. Underside finely spotted, neck pattern is two oblique spots. *Vipera albicornuta:* length (based on 3 male specimens) varies from 0.5 to 0.6 meters. Tail relatively long compared to other species in *V. raddei* group. Tail is 8.3 to 9.2 percent of total length. Ground color grayish-brown. Dorsal pattern consists of medium brown zig-zag line bordered with black. Rear of head has two tear-shaped black spots. Supraoculars (eyebrows) pale, very distinct. One band extends from eye back to corner of mouth. There is row on each side of the dark blotches running along each side. Belly mottled with ends of scales darkly edged. Throat whitish with some black speckles.

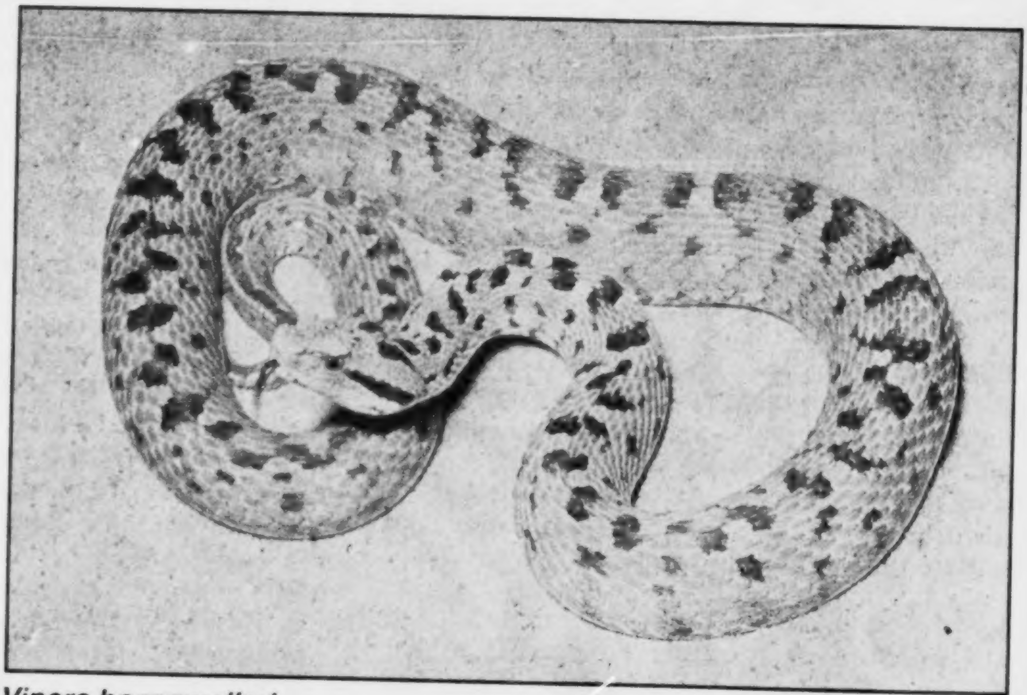
Behavior —Very little known about behavior of these species, but behavior presumed to resemble that of other *Vipera* species. *Vipera* spp. are basically nocturnal, but in cool weather may be active during daytime. Usually lethargic, slow-moving, but can be very aggressive if disturbed or stepped-on, or during mating season. Mating season probably occurs in mid-June. When disturbed, *Vipera* spp. tend to coil, probably emit a rasping sound. Usually will strike objects within striking distance.

Risk — Little known of venom components and their effects on humans. However, laboratory studies have indicated that *Vipera bornmuelleri* venom is toxic, possibly dangerous to humans. Presumably the venom characteristics may be the same as that of other *Vipera* species.

Clinical symptoms —*Vipera xanthina* complex: venom presumed to be hemotoxic with hemorrhagic activity. Symptoms manifestations are based on amount of envenomation: no envenomation — swelling subsides 1 hour after bite; slight envenomation — local swelling, tissue necrosis, increase in heart rate, decrease in blood pressure, nausea or vomiting; moderate envenomation — local or extended swelling, necrosis, regional lymphadenitis, two or more systemic symptoms such as diarrhea, vomiting, stomach cramps; severe envenomation — local or extended swelling, necrosis, regional lymphadenitis, systemic symptoms with circulatory shock and/or angioneurotic edema in area of mouth.

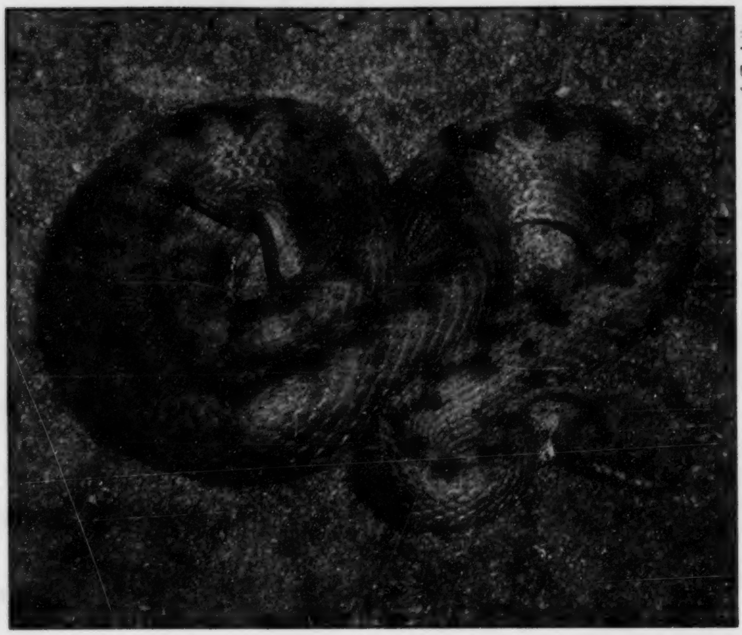
ANTIVENOMS:

IRAN: "Latifi antivenom" (Antivenom for *Vipera latifii* may be effective for other species in the *Vipera xanthina* complex); "Poly-specific" (possibly effective)
ROGO: "Palestine Viper" (Possibly effective)



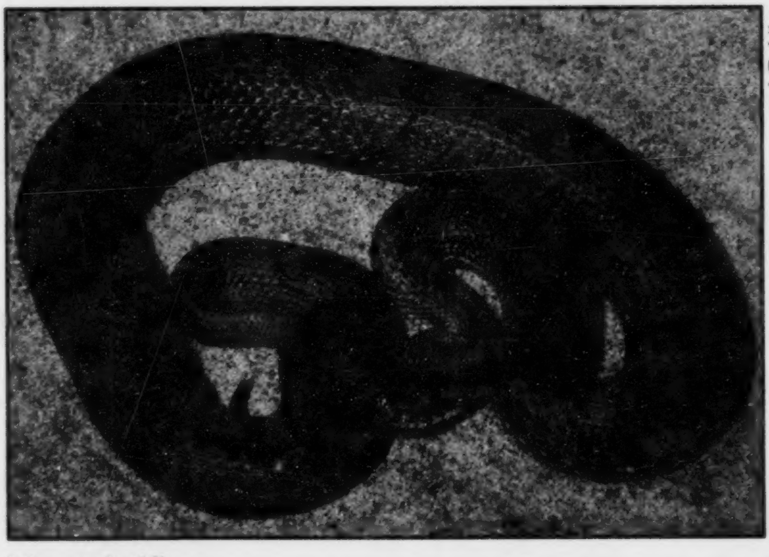
I. Tashjian

Vipera bornmuelleri



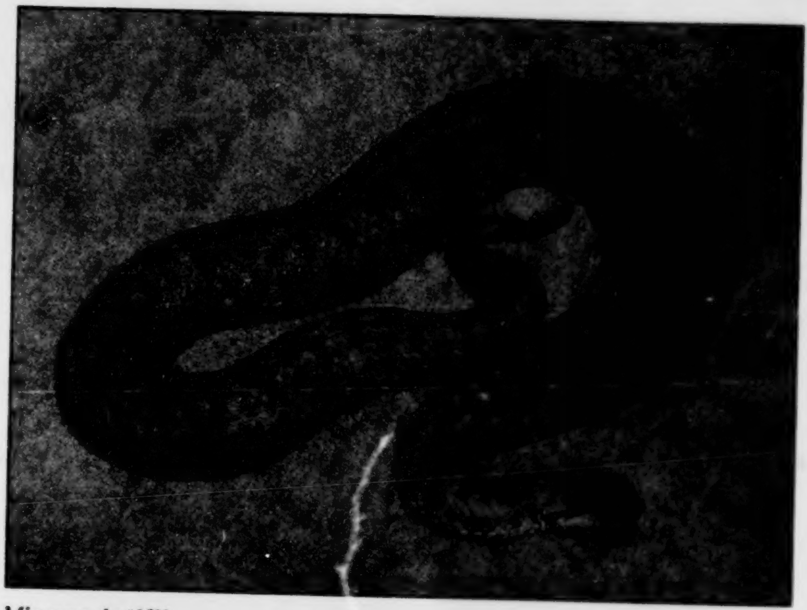
J. Tashjian

Vipera latifii



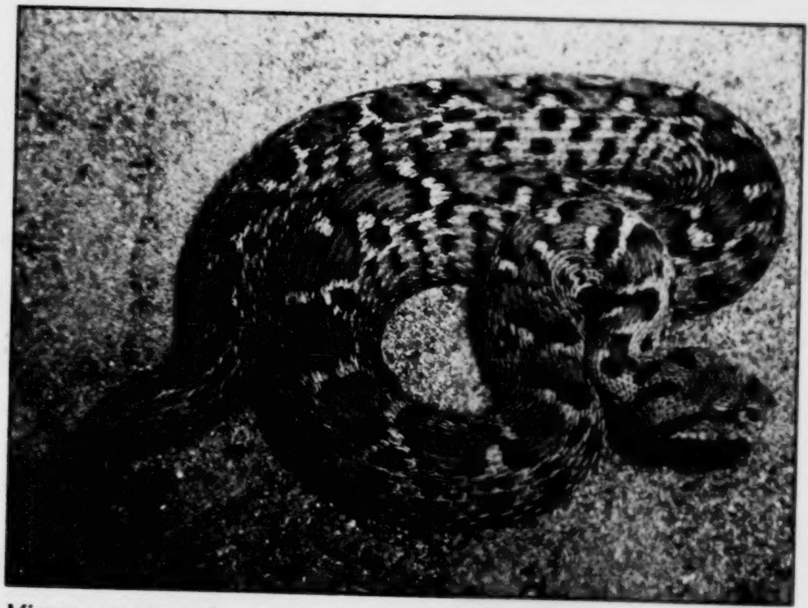
J. Tashjian

Vipera latifi



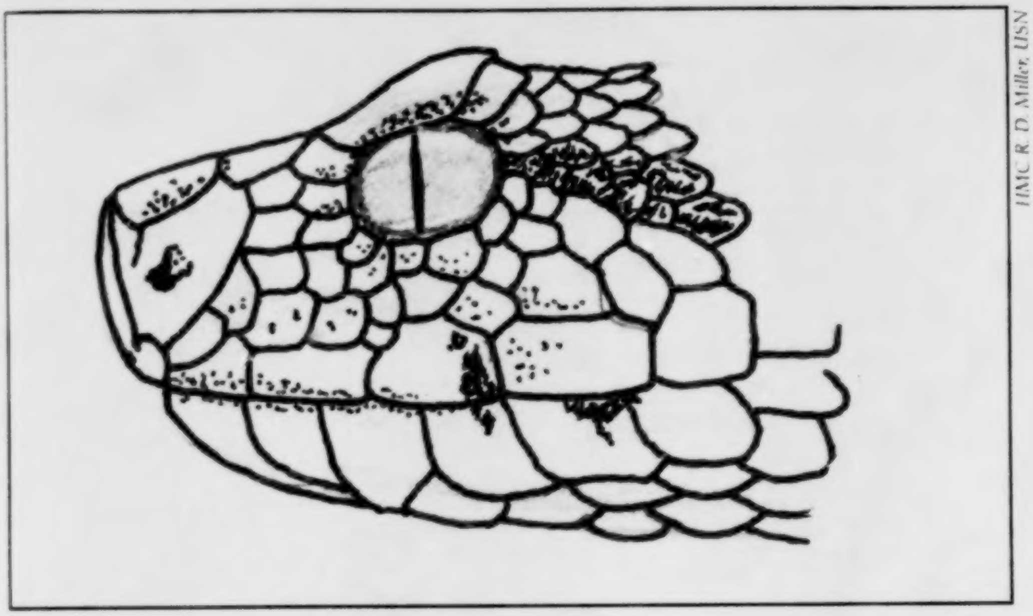
J. Tashjian

Vipera latifii



J. Tashjian

Vipera wagneri



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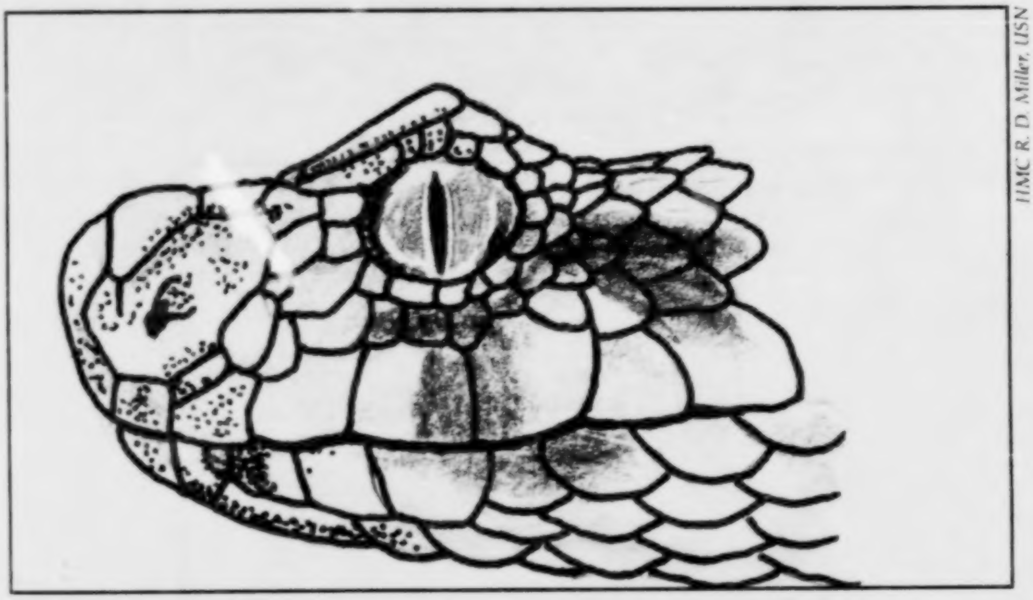
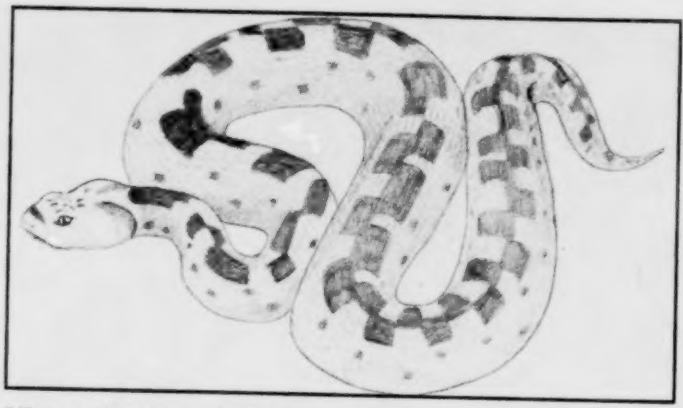
Vipera raddei; **head, lateral view**



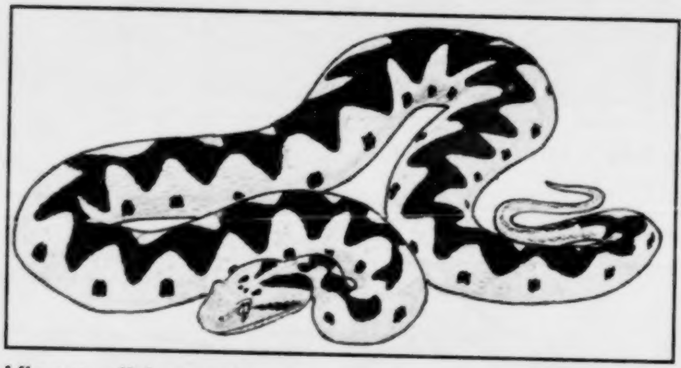
HMC R. D. Miller, USN

Vipera xanthina; **head, lateral view**



HMC R. D. Miller, USN

Vipera bulgardaghica



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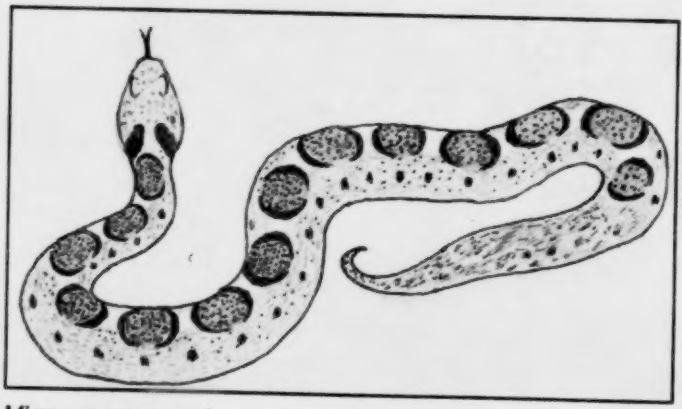
Vipera albicornuta



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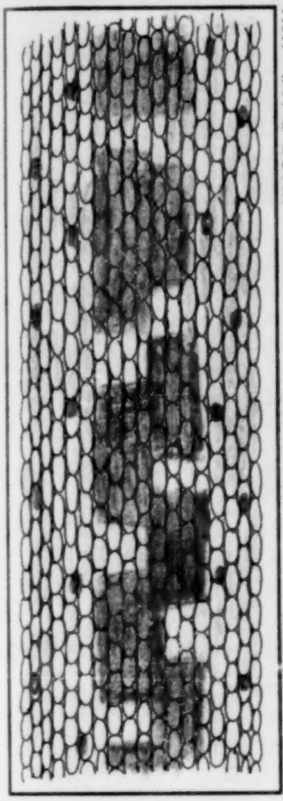
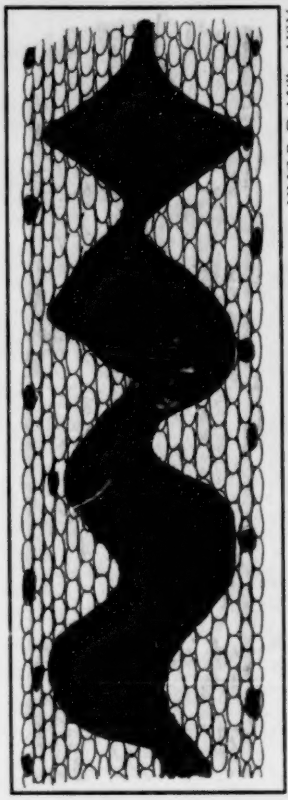
Vipera wagneri



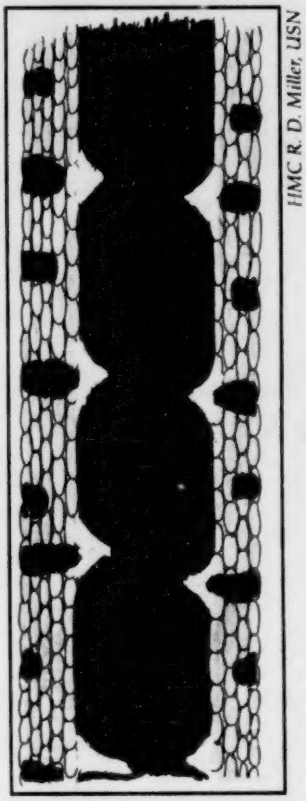
HMC R. D. Miller, USN

Vipera bulgardaghica; dorsal pattern



HMC R. D. Miller, USN

Vipera xanthina; dorsal pattern in both sexes in south and male in north



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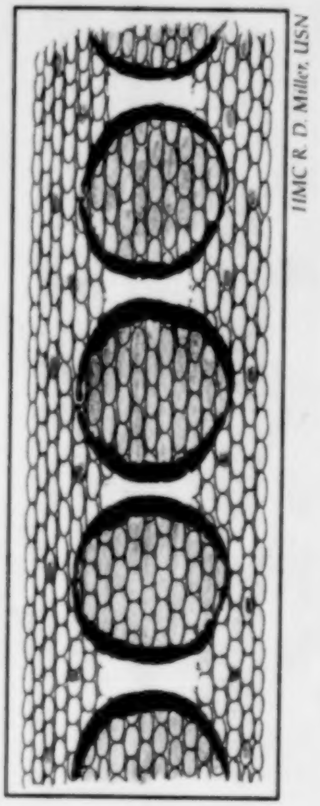
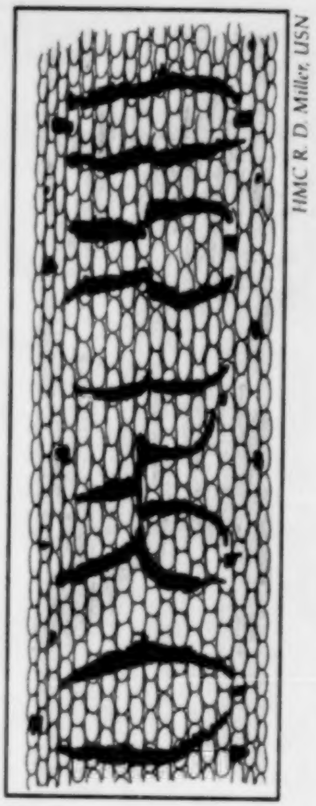
Vipera xanthina; dorsal pattern for many northern females


HMC R. D. Miller, USN

Vipera wagneri;
dorsal pattern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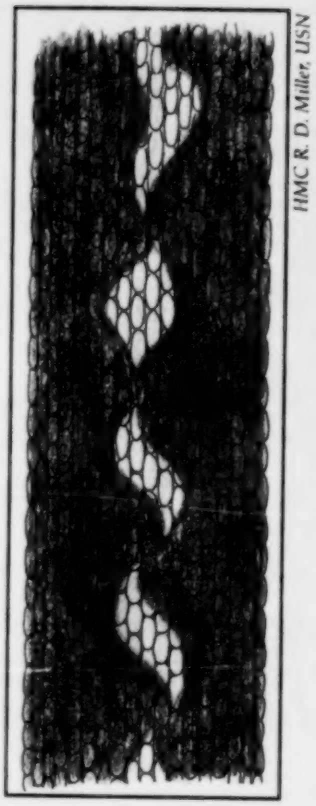
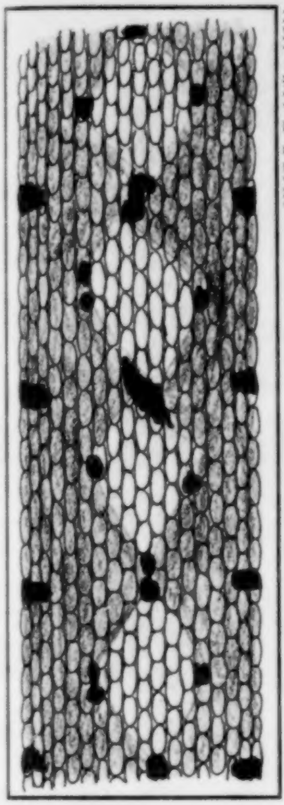
Vipera bornmuelleri;
dorsal pattern


HMC R. D. Miller, USN

Vipera raddei;
dorsal pattern in both sexes; in northern populations



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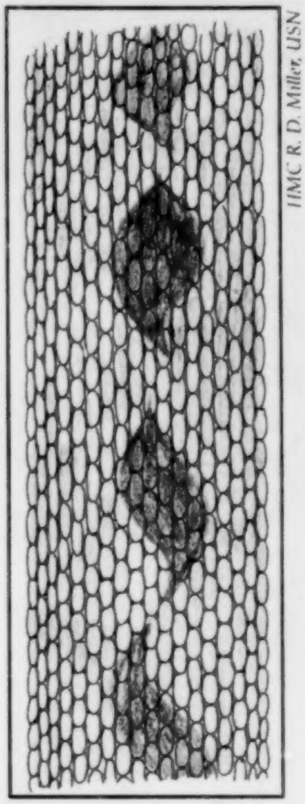
Vipera raddei; pattern in both sexes in north; rarely in south



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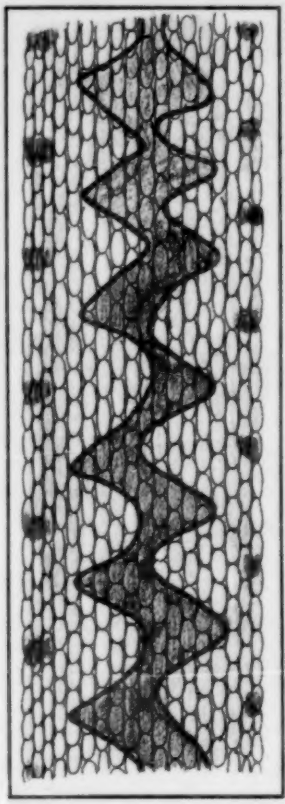
Vipera raddei: pattern in southern populations



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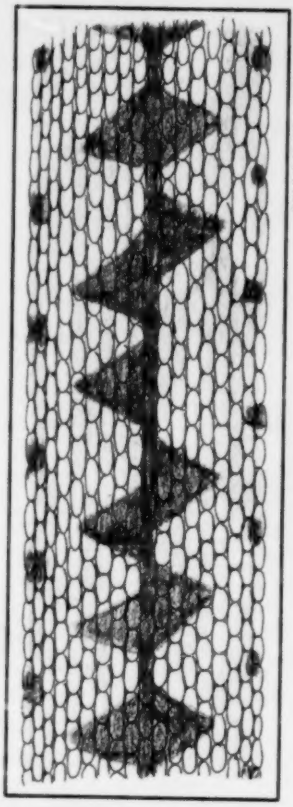
Vipera albicornuta; dorsal pattern



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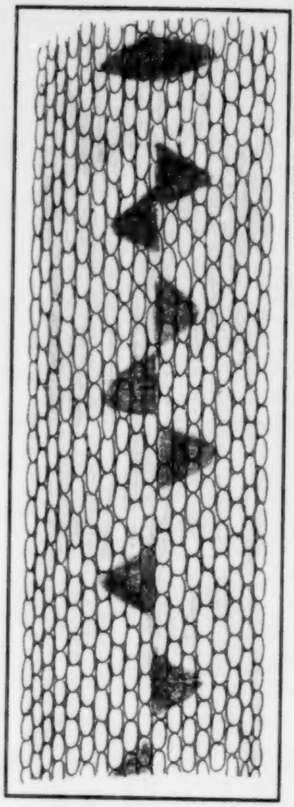
Vipera latifii;
dorsal pattern



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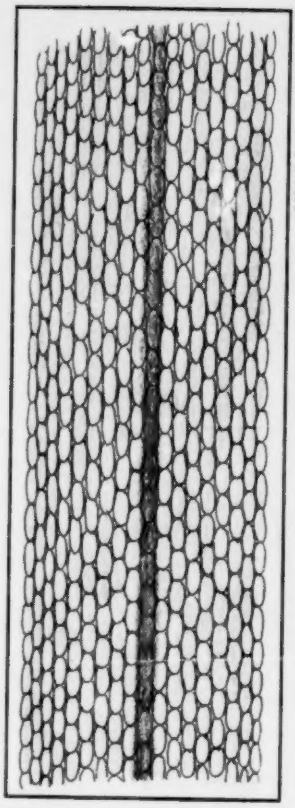
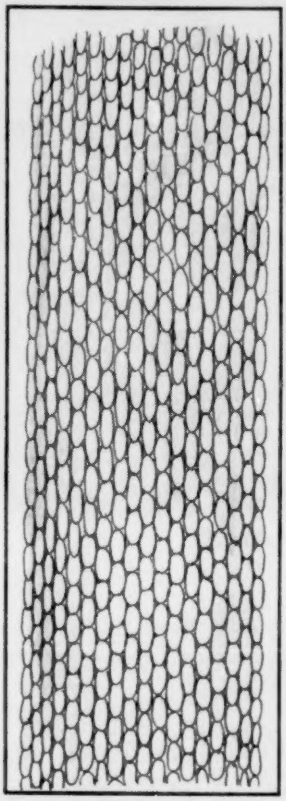
Vipera latifii;
dorsal pattern

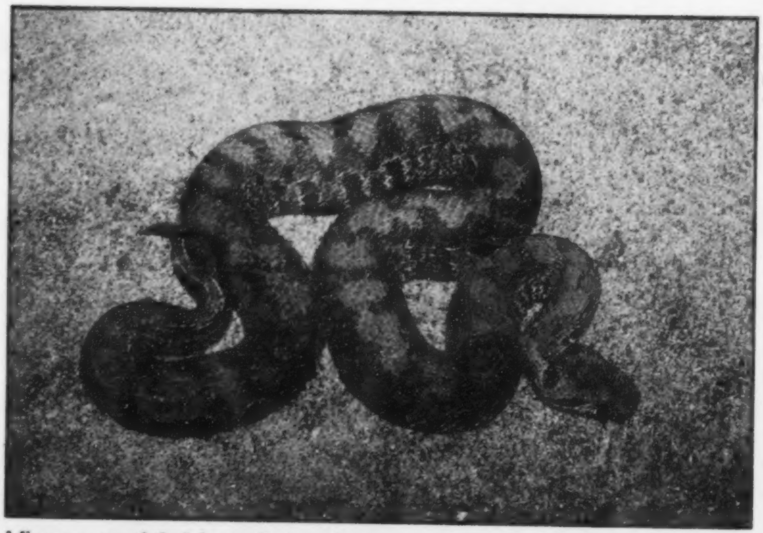


IIMC R. D. Miller, USN

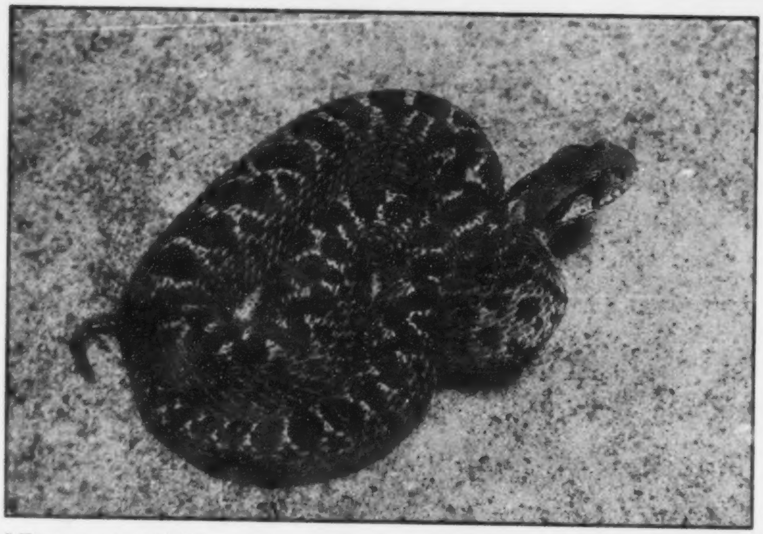
Vipera latifii;
dorsal pattern


IIMC R. D. Miller, USN

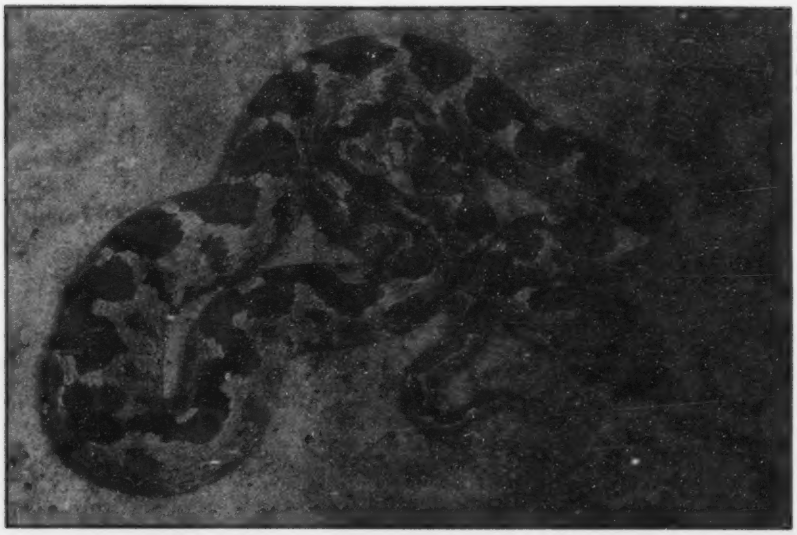
Vipera latifii;
dorsal pattern


J. Tashjian

Vipera raddei kurdistanica

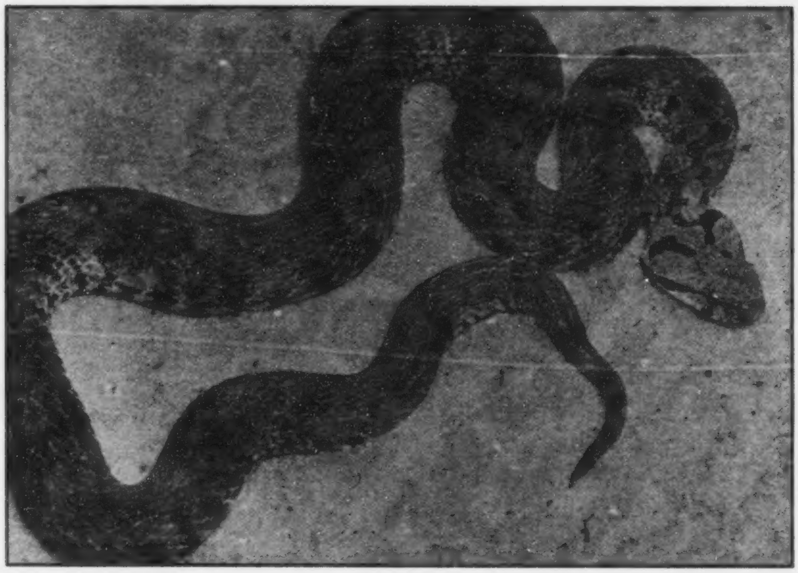

J. Tashjian

Vipera xanthina



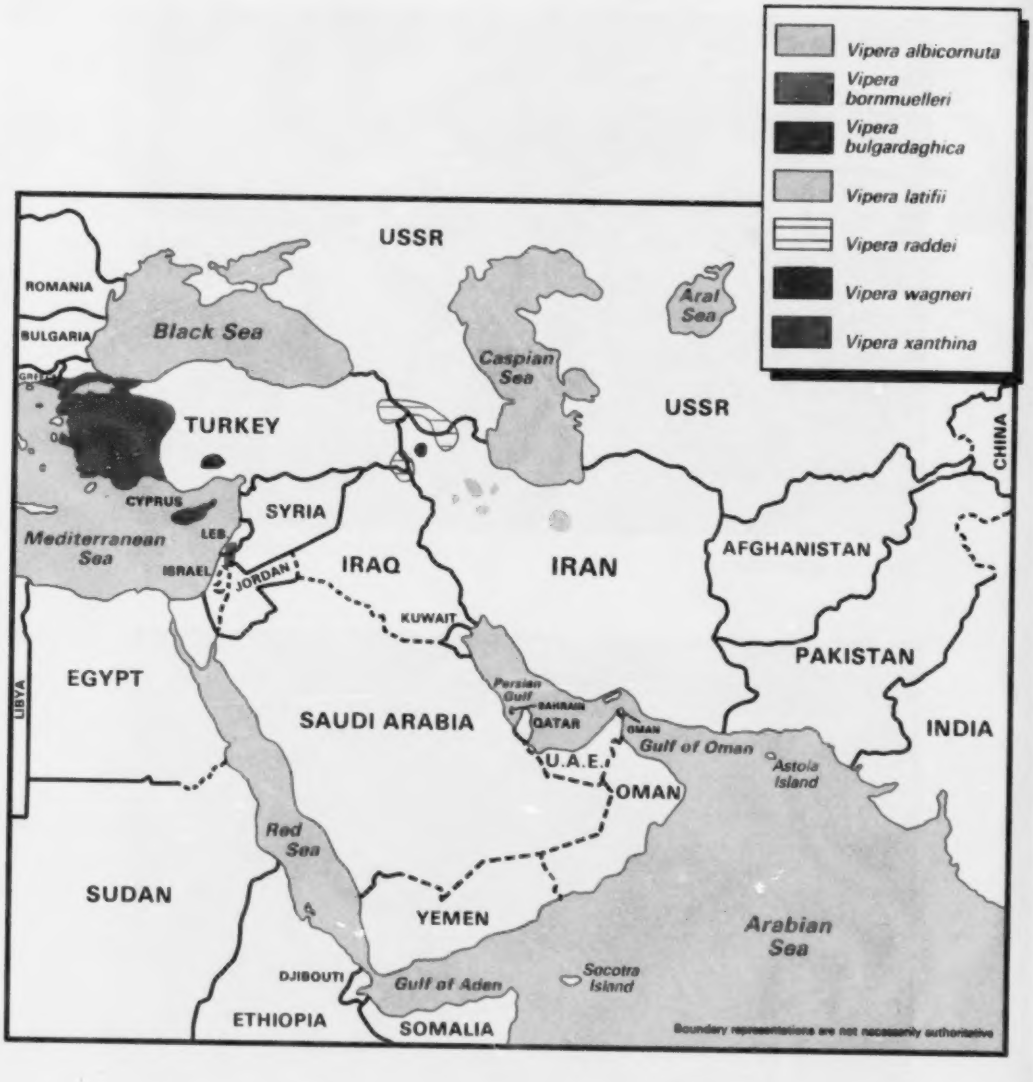
J. Tashjian

Vipera xanthina



J. Tashjian

Vipera raddei


Vipera albicornuta
Vipera bornmuelleri
Vipera bulgardaghica
Vipera latifii
Vipera raddei
Vipera wagneri
Vipera xanthina
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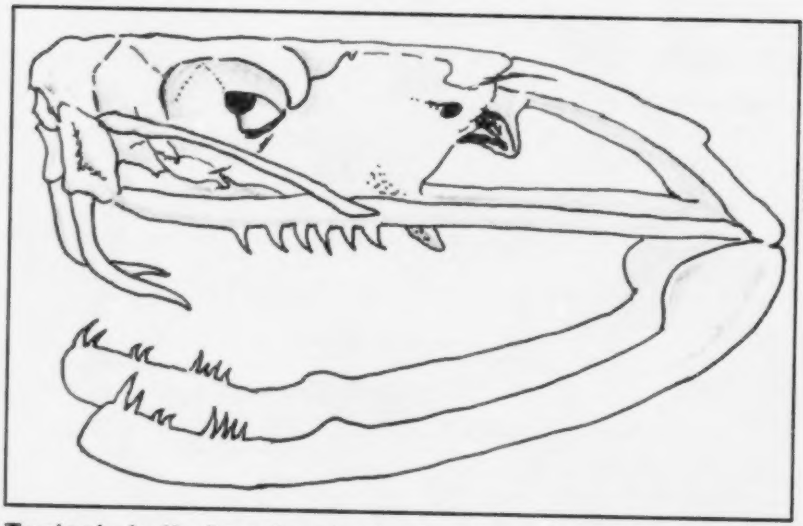
ROMANIA
BULGARIA
GREECE
Black Sea
Aral Sea
Caspian Sea
USSR
TURKEY
CHINA
CYPRUS
SYRIA
Mediterranean Sea
LEB.
ISRAEL
JORDAN
IRAQ
IRAN
AFGHANISTAN
KUWAIT
PAKISTAN
EGYPT
LIBYA
Persian Gulf
BAHRAIN
QATAR
SAUDI ARABIA
OMAN
Gulf of Oman
Astola Island
INDIA
U.A.E.
OMAN
Red Sea
SUDAN
YEMEN
Arabian Sea
Socotra Island
DJIBOUTI
Gulf of Aden
ETHIOPIA
SOMALIA
Boundary representations are not necessarily authoritative

Section IV.
Snakes of the Family *Crotalidae*



HCM R.D. Miller, USN

Typical skull of snakes in the families *Viperidae* and *Crotalidae*

SECTION IV. SNAKES OF THE FAMILY *CROTALIDAE*

Agkistrodon complex

(some taxonomers consider the Family *Crotalidae* as a subfamily of *Viperidae*, called *Crotalinae*)

RISK CATEGORY IV (Little risk). Frequency of envenomation low; venom only slightly toxic.

Species/subspecies/common names —*A. halys boehmei* (one specimen misidentified as *A. h. caraganus*): Bohme's Pit viper (Afghanistan)
A. himalayanus: Himalayan pit viper (Pakistan, possibly Afghanistan)
A. intermedius caucasicus (formerly known as *A. halys caucasicus;* one specimen also known as *A. halys boehmei*): Caucasan mamushi, Siberian mamushi (Iran, Afghanistan), Asiatic pit viper, Halys' viper, Mamushi, Pallas's viper.

Distribution/habitat — *A. h. boehmei*: Found in Anderab Valley, eastern Afghanistan. Habitats include steppe and semidesert regions with many rocks and boulders, mountainous steppe areas at elevations as high as 4,000 meters. *A. himalayanus*: found near Chitral, northwestern Pakistan; probably also in adjoining Afghanistan territory near Konar River. Also has been reported in Anderab Valley, eastern Afghanistan. Normally found among coniferous forests at elevations of 3,000 to 4,000 meters. Also occurs near lower limits of mountain glaciers at elevations as high as 4,880 meters. *A. i. caucasicus*: found in northeastern Iran near Soviet Transcaucasia; near southwestern shores of Caspian Sea; in Kopet-dagh mountains, northeastern Iran (along the border with Soviet Central Asia); in northwestern Afghanistan, north of Herat. Eastern limit of snake's range in Afghanistan unknown, but may occur in Anderab Valley. Present in Alburz Mountains, Iran, between Tehran and Caspian Sea, in lightly wooded areas and above timberline at elevations between 500 and 3,000 meters.

Identification — Usual average length 0.5 to 0.7 m. Maximum length of *A. h. boehmei, A. h. caucasicus* less than 0.6 m. Maximum length of *A. himalayanus* approaches 0.9 m. Body robust. Topside gray, yellowish, or brownish, with series of dark-edged, dark gray crossbands along backbone, reaching down sides. One or two rows of small black spots run along both sides. Crossbands and spots may fuse to form irregular pattern. Variations occur; orange, reddish, or black specimens can be found. Ventral side gray to dark gray with dark spots. Head narrow, flattened on top, distinct from neck. Eyes small, pupils vertical. Top of the head has 9 large plates. Head has several markings, including a bar between eyes, a short stripe from each eye to corner of mouth, a dark spot on top of snout. Snout usually rounded, but can be slightly upturned at tip. There is a large pit on each side of snout between eye and nostril, but closer to mouth. Tail short, comprising about one-eighth of total length. Tip of tail yellowish, dark brown, or black.

Behavior — Behavior of snakes in this group similar. They hibernate on or near rocky bluffs from November to March. During breeding season (April to July) groups of snakes may be found; groups of specimens may be found shortly after hatching (late July to October). Primarily nocturnal, they rest during the day beneath stones or shrubs, emerge (during warmer months) only after sunset. Pits on sides of snout used as heat receptors to detect warm-blooded prey. Reports concerning snakes aggressiveness vary, indicating that they will not strike unless continuously disturbed or injured; others suggesting that they will bite with only minor provocation.

Risk — The number of deaths (if any) caused by these snakes in southwest Asia is unknown. Venom toxicities vary; generally venoms are very toxic. Snakes are small, venom yield is low. Bite painful, but victim normally recovers without ill effects within a few weeks.

Clinical symptoms — Primarily hemotoxic, but also has proteolytic and blood coagulation modifying components. Two anticoagulant factors and a neurotoxin have been reported. Envenomation causes sharp pain at bite site, followed by edema, necrosis, increases in heart rate, blood pressure. In mild cases, symptoms subside after a few days; in severe cases, they persist and worsen. Death, when it occurs, usually caused by respiratory failure secondary to neurotoxin.

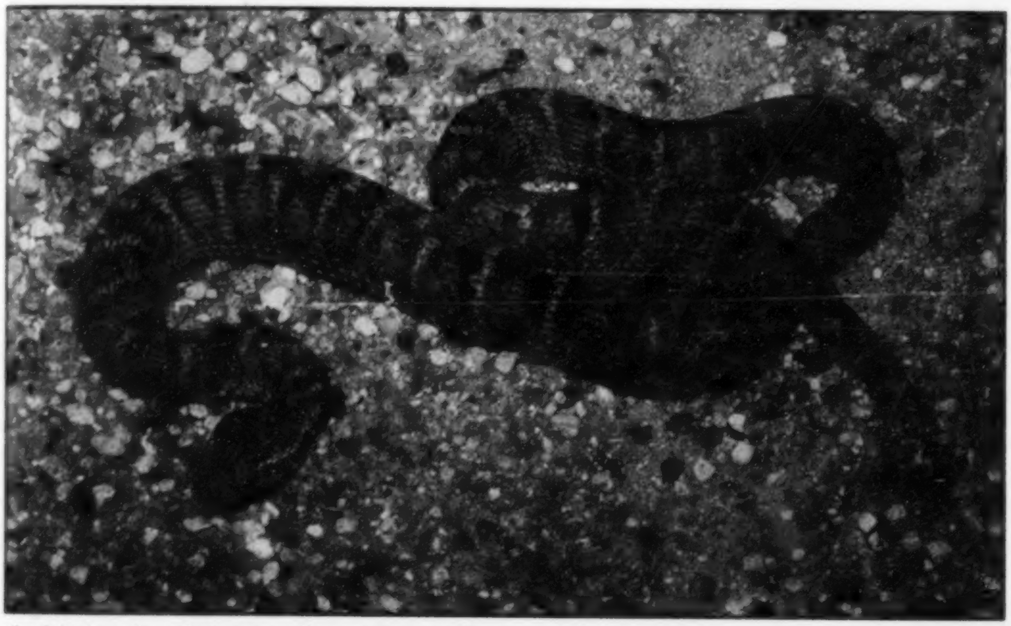
ANTIVENOMS: Antivenoms listed are known to be effective in neutralizing *Agkistrodon halys* venom; may also be effective against *Agkistrodon himalayanus* and *Agkistrodon intermedius*:

CHINA: "Monovalent Mamushi"
ICH: "Mamushi"
IRAN: "Mono-specific *Agkistrodon* antivenom"
KITA: "Mamushi"
OSAK: "Mamushi"
TAK: "Mamushi"

WYETH: "Antivenin (*Crotalidae*) Polyvalent"

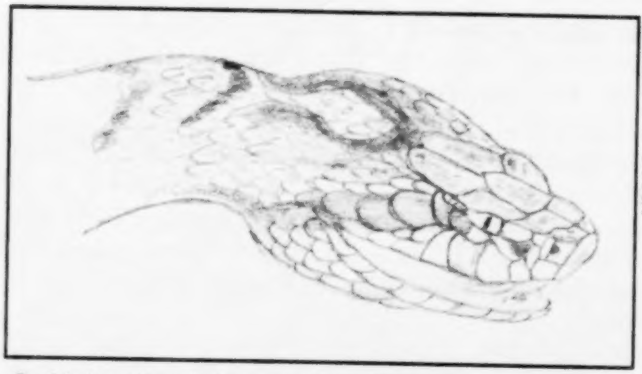
Other antivenoms which may be effective in neutralizing southwest Asian *Agkistrodon* spp. venoms include:

BAND: Unnamed *Agkistrodon rhodostoma* monovalent
CHINA: "100-Pace snake"
KUMA: "Habu antivenom" (partial neutralization)
TAI: "*Agkistrodon*", "*Trimeresurus*"
TWY: "Snake Antivenom Twyford (Malayan Pit Viper)"
THAI: "Malayan Pit Viper"



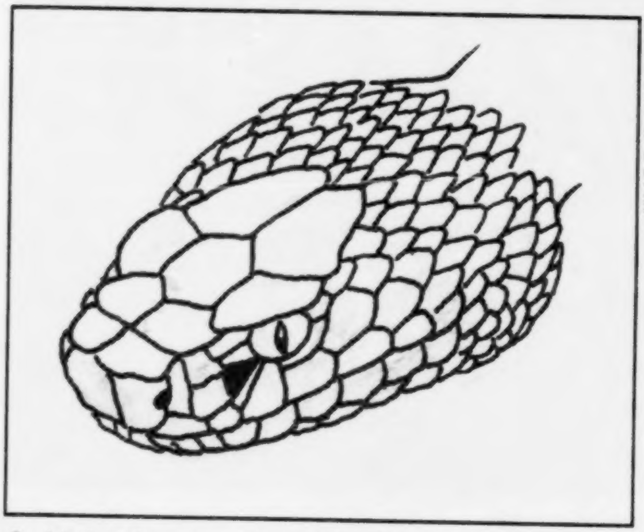
I Tashjian

Agkistrodon intermedius caucasicus



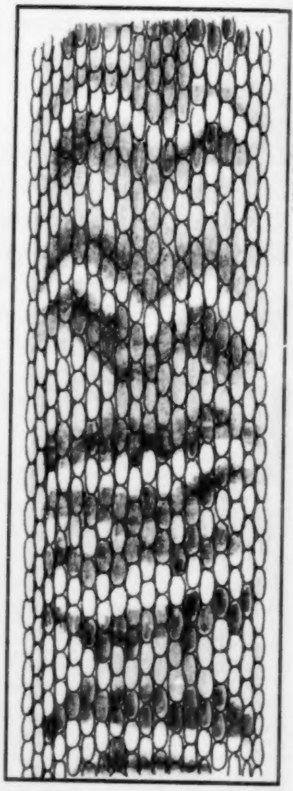
IIMC R. D. Miller, USN

Agkistrodon intermedius; head



IIMC R. D. Miller, USN

Agkistrodon species; showing loreal pit



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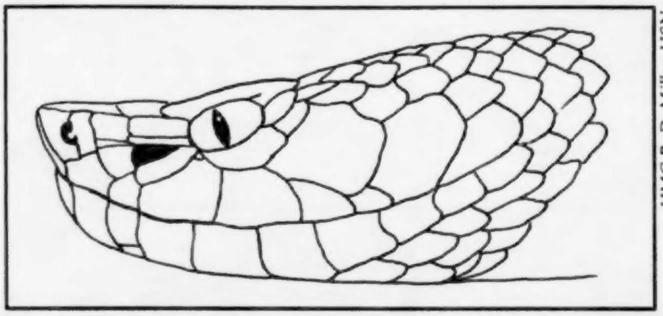
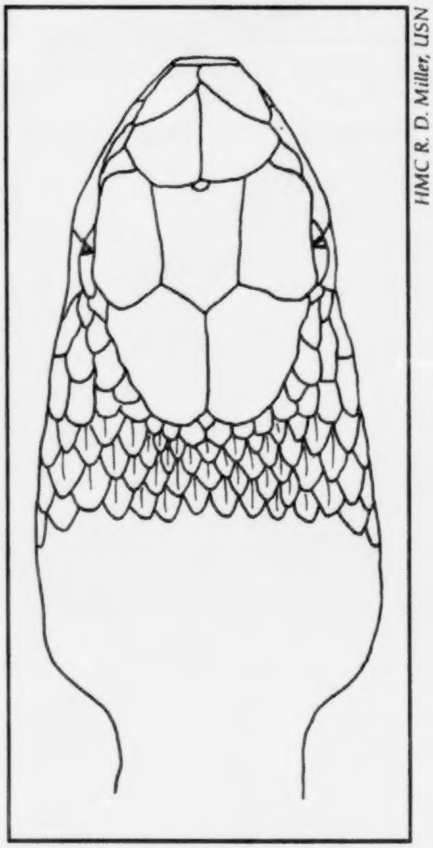
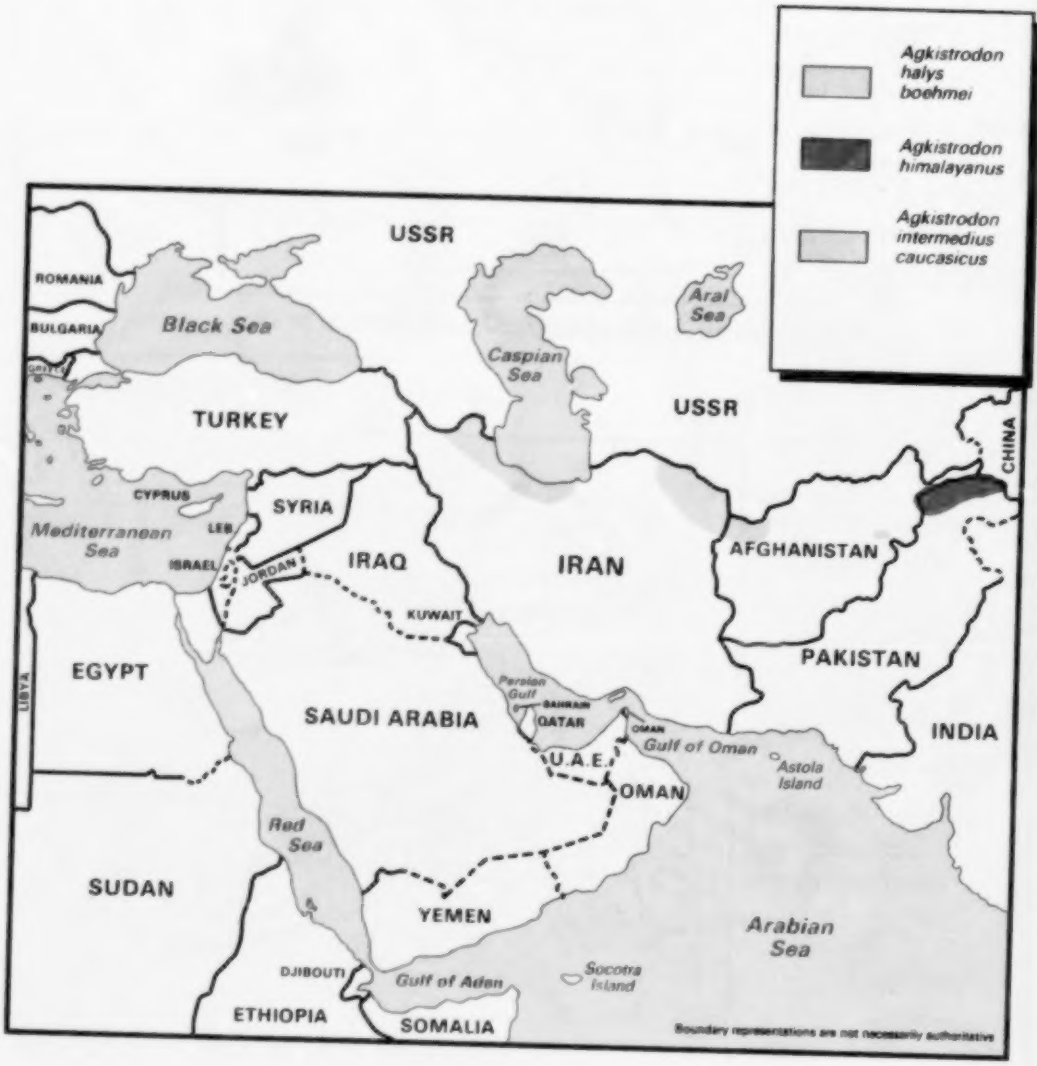
Agkistrodon intermedius; **dorsal pattern**



Agkistrodon himalayanus; **head; dorsal view**



Agkistrodon himalayanus; **head; lateral view**


Agkistrodon halys boehmei
Agkistrodon himalayanus
Agkistrodon intermedius caucasicus
USSR
ROMANIA
BULGARIA
Black Sea
Caspian Sea
Aral Sea
USSR
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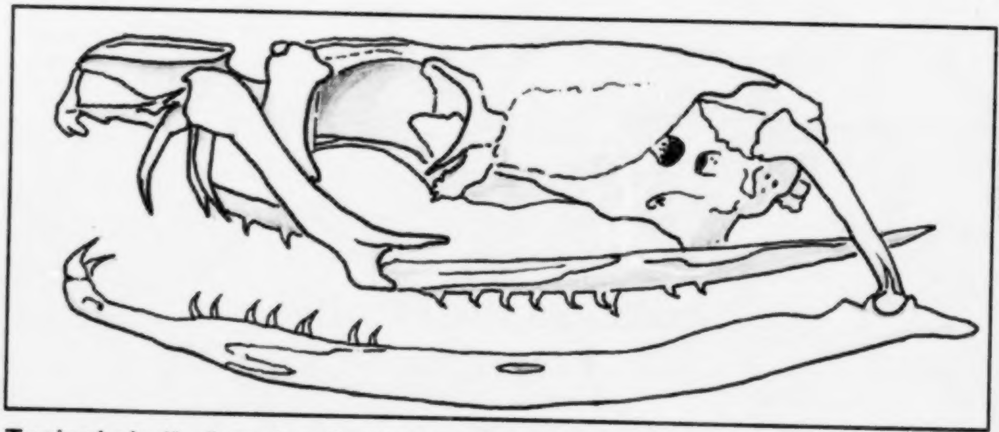
Section V.
Snakes of the Family *Elapidae*



HCM R.D. Miller, USN

Typical skull of snakes in the families *Elapidae* and *Hydrophidae*

SECTION V. SNAKES OF THE FAMILY *ELAPIDAE*

Bungarus caeruleus

RISK CATEGORY II (Moderate risk). Frequency of envenomation moderate; venom highly toxic.

Common names — Blue krait, Indian krait

Subspecies — *Bungarus caeruleus sindanus*

Distribution/habitat — Found in Pakistan from coastal lowlands north and eastward to Waziristan and Quetta regions. Also found near southwestern Pakistan coast not far from Iran-Pakistan border. In Afghanistan, has been found near Khowst, Paktia Province, and in Kabul Valley. Found in dry open plains, in termite mounds, in burrows of small rodents, beneath debris, at elevations as high as 1,700 meters. Needs ample water supply, so may be found in moist and wet areas such as wells or tanks containing water. Often found near or in human habitation.

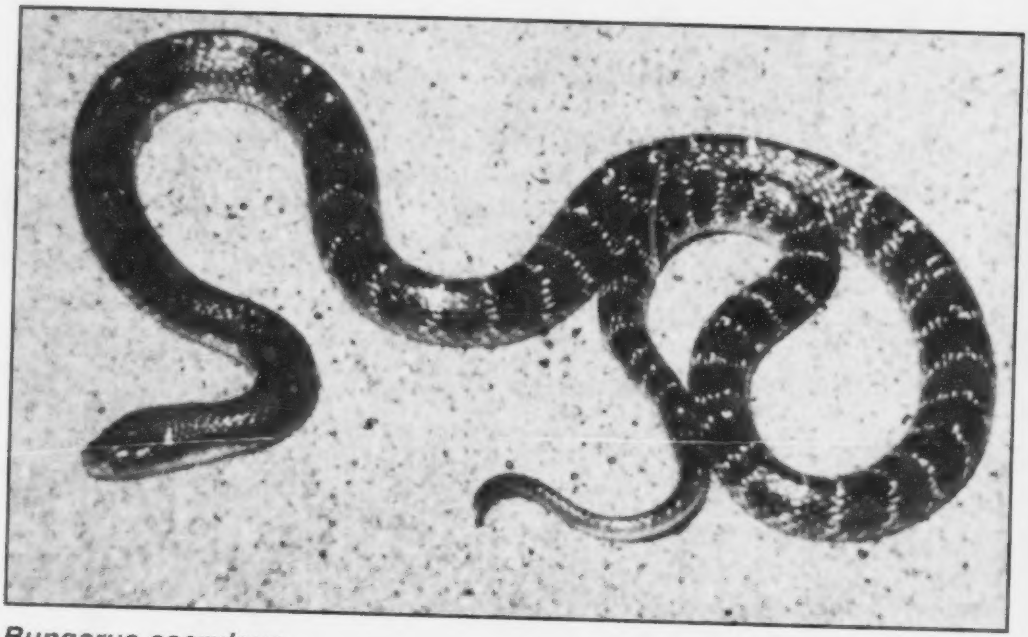
Identification — Average length, 1.0 meters; maximum length, 1.8 meters. Moderately slender. Has smooth, glossy appearance. Color varies: can be blue-black, pale bluish-gray, steel blue, brown, uniformly black. Paired narrow white, yellow, or grayish crossbands. Young specimens may have white spots instead of crossbands along first one-third of body. Underside white. Head egg-shaped, slightly distinct from neck. Eyes small, snout short, upper lip white or yellow, tail short, tip pointed.

Behavior — Nocturnal. Very active, agile at night. Often hides in rodent holes, loose soil, beneath debris, so is rarely seen during day. When agitated, will coil up with head concealed, body flattened, and make jerky movements. May also lift tail. Reluctant to bite, but may make a quick, snapping bite. Generally docile, unaggressive during day, but may become aggressive during night.

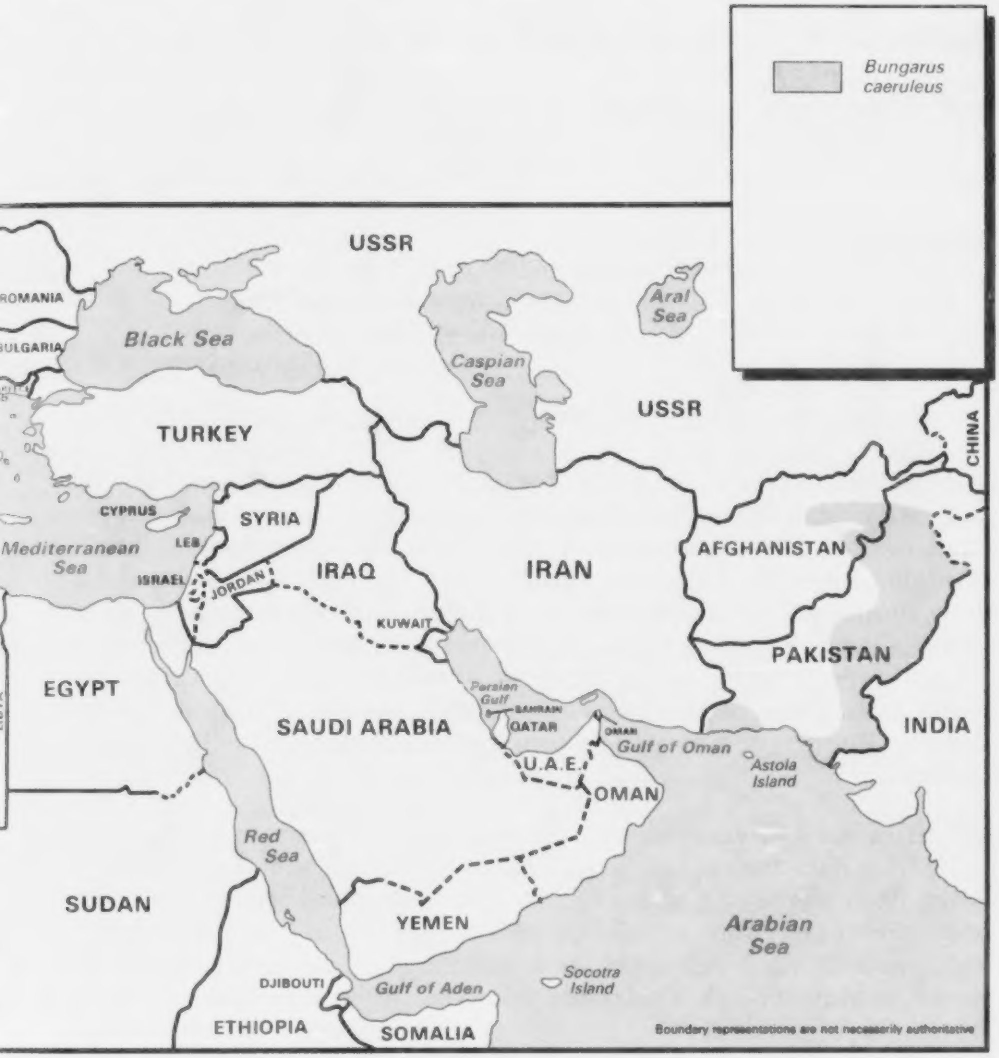
Risk — Most dangerous of *Bungarus* species. Venom very highly toxic. Bites rare, but in one study 77 percent of victims died.

Clinical symptoms — Venom neurotoxic. No local symptoms except signs of ptosis, occasionally shock, sometimes abdominal pain, difficulty breathing, sensation of weight on chest. Bite usually painless, no swelling. Further elaboration of symptoms appears at end of section.

ANTIVENOMS: Antivenoms known to be effective:
HAFF: *"Bungarus"*, "Polyvalent Anti-snake Venom Serum"
KASA: "Polyvalent"
Antivenoms possibly effective:
NIH: "Anti-snake Venom Serum Polyvalent", *"Bungarus* monovalent"


J. Tashjian

Bungarus caeruleus



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RISK CATEGORY II (Moderate risk). Frequency of envenomation moderate; venom may be highly toxic.

Subspecies/common names —*N. h. arabicus*: Arabian cobra (Saudi Arabia, Yemen, Oman)
N. h. haje: African banded cobra, banded cobra, brown cobra, Cleopatra's asp, Egyptian cobra (Egypt)

Distribution/habitat — *N. h. haje*: found throughout eastern and northern parts of Egypt. *N. h. arabicus*: found in southwestern part of Arabian peninsula along southern Red Sea coast of Saudi Arabia south from Medina, throughout western Yemen (in former North Yemen) and vicinity of Aden, along southern Yemen coast, and from Yemen-Oman border as far east as Mirbat, Oman. Found in various habitats: flat lands with scrubby bushes, grass clumps; irrigated fields; rocky hillsides; old ruins; not found in permanently moist areas, or rain forest areas. Often occupies abandoned rodent burrows. Reports of *N. haje* in eastern Jordan, southern Israel, western Iraq doubtful.

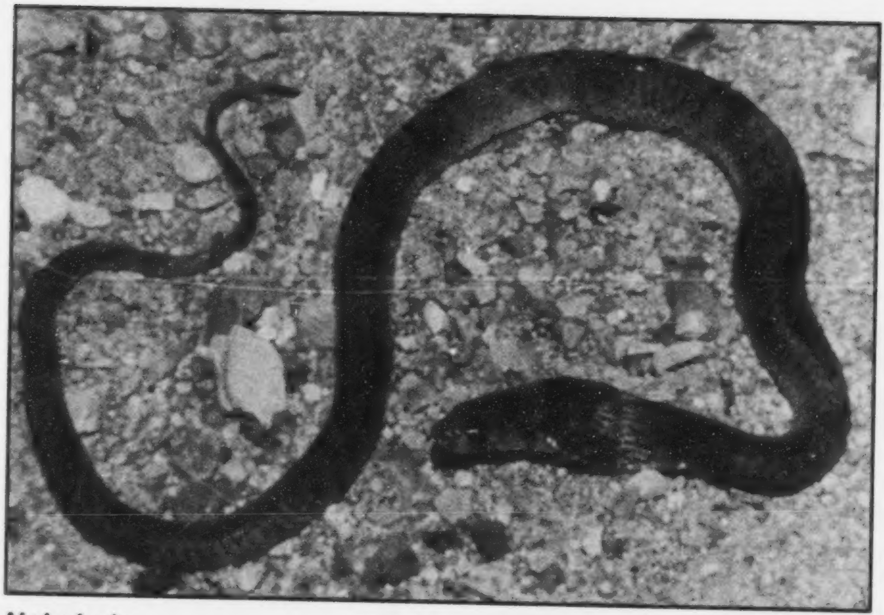
Identification — Average length 1.5 to 1.8 meters; maximum length 2.5 meters. Males have longer tails, wider heads and hoods are heavier than females. Body shape cobra-like. Head short, wide, not distinct from neck. Body moderately stout, graceful, with even taper and moderately long tail. Scales smooth, have dull sheen. *N. h. haje* may be brownish yellow, dark brown, or almost black. Underside yellowish, the yellow often mixed with brown. Dark bars appear across neck at level of hood. Some populations show distinct banded pattern. Young specimens yellowish, head and neck black, body crossed by dark bands. Head, neck almost always slightly darker. Small scales below eye distinguish *N. h. haje* from other African cobras. Eye size moderate, pupils round. Eye color varies. *N. h. arabicus* similar in appearance, but generally golden brown or golden yellow.

Behavior — Found in termite nests, rodent burrows, rock crevices. May bask near lair during day, travel further afield at night to hunt, often entering houses in search of prey. Snake's reported aggressiveness doubtful; behaves rather timidly, often seeming to make little effort at defense. Usually gives an intruder ample warning by rearing up with hood spread. May bite without spreading hood, sometimes spreads hood without raising upper body, sometimes feigns death, remaining still, apparently lifeless, even when handled. Snake's reportedly poor eyesight questioned; responds quickly to movement and general shapes. An open umbrella or similar large object placed between snake and intended victim may cause snake to break off attack, retreat: such objects also can block snake's lunge, preventing envenomation.

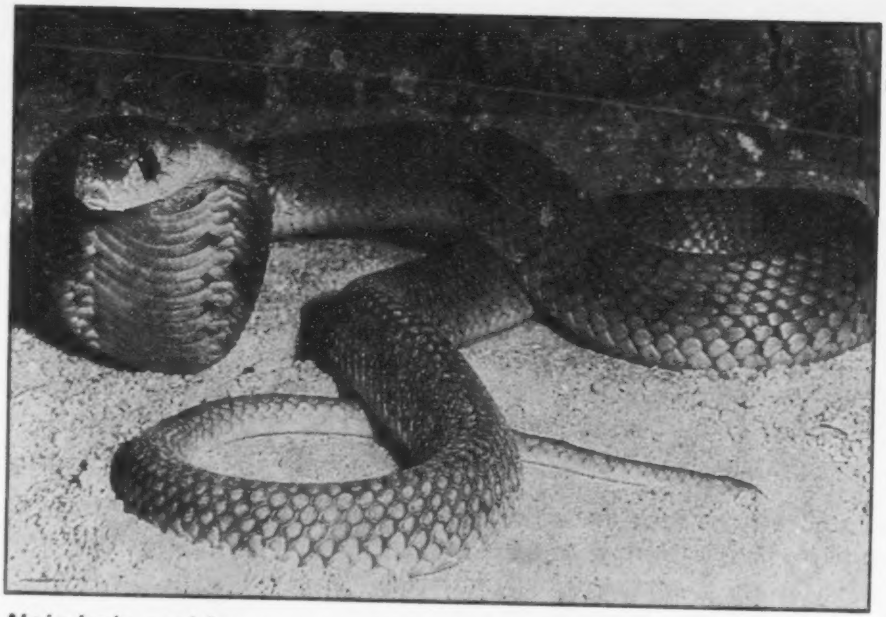
Risk — Both have large fangs, large venom glands; venoms highly toxic, large amounts may be injected in single envenomation. A lethal envenomation by *N. h. arabicus* can kill within 5 hours, or as short as 15 minutes if venom is injected directly into vein.

Clinical symptoms — Venom neurotoxic; acts on nervous system, affects respiratory center primarily. Venom also contains cardiotoxin that can stop heart. Amount of venom snake can inject varies at different months, is more toxic during summer than during winter. Further elaboration of symptoms appears at end of section.

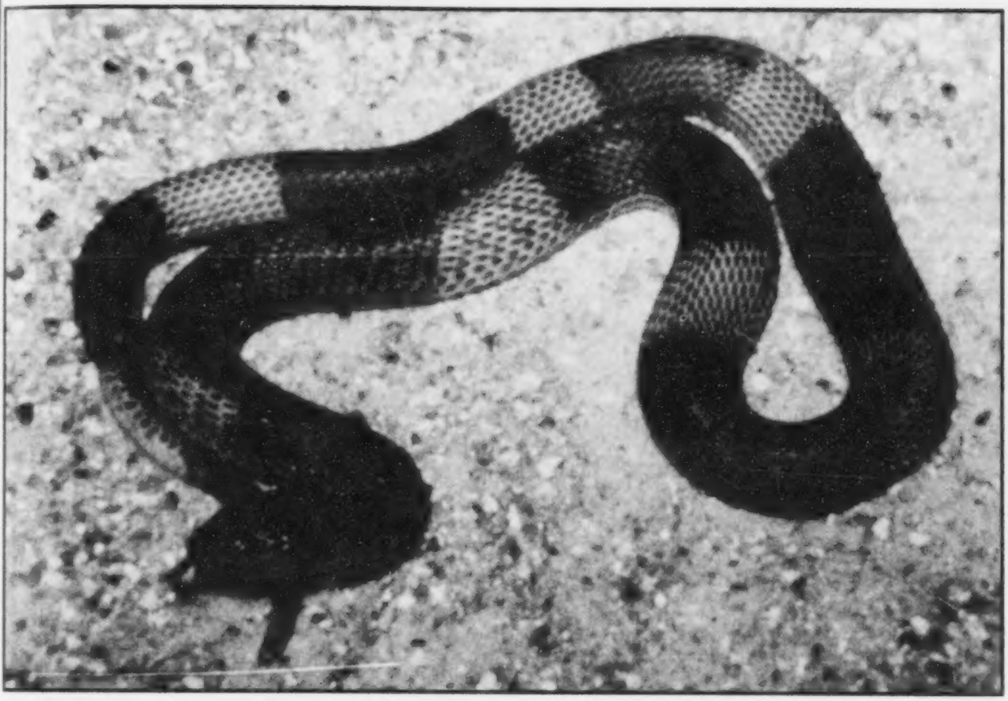
ANTIVENOMS: Antivenoms known to be effective:
BEHR: "Central Africa", "Near and Middle East", "North and West Africa"
PAST: "Antirept Pasteur",
"*Bitis-Echis-Naja*" (if available), "Near and Middle East" (if available), "Pasteur Ipser Afrique"
SAIMR: "Polyvalent"
Antivenoms which may be effective:
FITZ: Unnamed Cobra-*Bitis* polyvalent


J. Tashjian

Naja haje

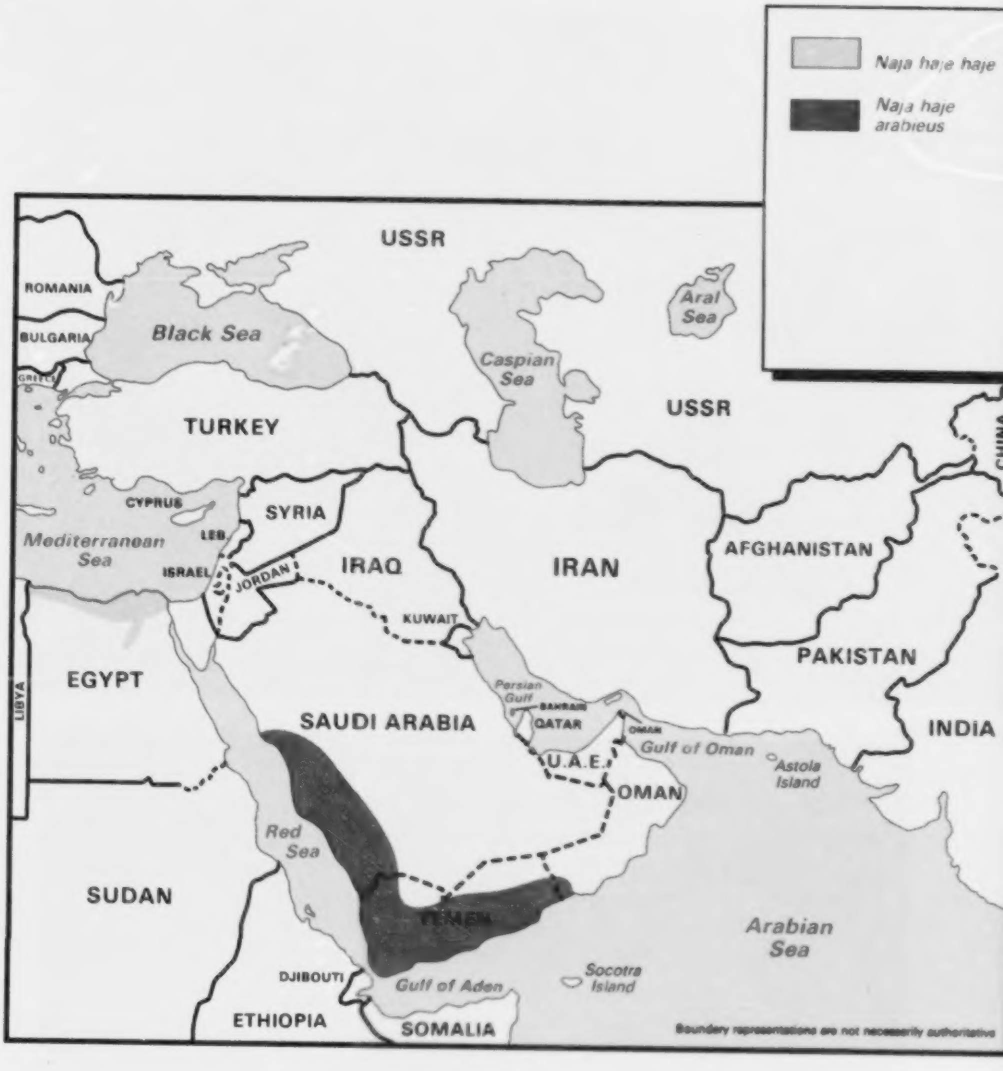

K. Lucas

Naja haje arabicus



J. Tashjian

Naja haje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Naja mossambica

RISK CATEGORY II	(Moderate risk). Frequency of envenomation moderate; Venom highly toxic.
Common names —	Mozambique spitting cobra, red spitting cobra, red spitter
Subspecies —	*N. m. pallida* (Egypt)

Distribution/habitat — One subspecies found in southern part of Egypt. Habitats include arid areas, savannas and grasslands near water; also found near human habitations. Seldom found at elevations above 1,500 meters.

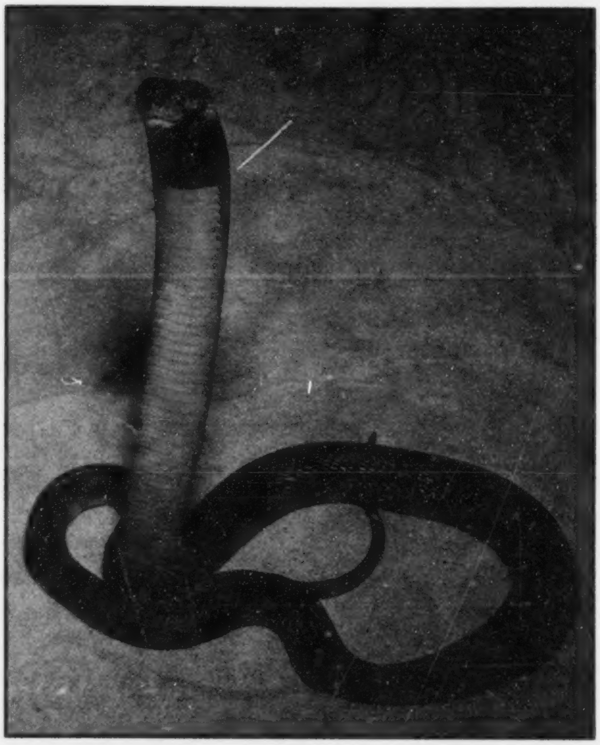
Identification — Much smaller than *N. nigricollis.* Average length, 1.0 meter; maximum length, 1.6 meters. Scales smooth with satin texture; belly glossy. Head blunt, slightly distinct from neck. Tail length moderate. Hood egg-shaped, not as pronounced as that of *N. haje*. Mostly brown-red, salmon, pink, or orange-red. Belly salmon, pink, or yellowish. Each scale darkly edged. Irregular crossbands and blotches on throat.

Behavior — Nocturnal, terrestrial, but juveniles fairly active during day. Adults bask in sun during day, but most often are found in termite mounds, hollow trees, logs, rock crevices, rodent burrows. Hunts prey at night. Not naturally aggressive. Most bites occur at night; gives ample warning during day. Seldom stands its ground, generally shies away, hides. If cornered, may lift two-thirds of body off ground, spread narrow hood; will not hold stance for long periods of time. In defensive stances, does not always spread hood; may open jaw slightly before "spitting". If disturbed further, will tilt head, spray venom, aiming for victims face. Effective range 2 meters. Bites occur only if victim at close range. Snake bites, and chews. Sometimes "plays possum", remaining still even when handled.

Risks — Rarely attempts to bite unless molested. Is more likely to spray or "spit" at face of molester. Venom extremely toxic and primarily neurotoxic.

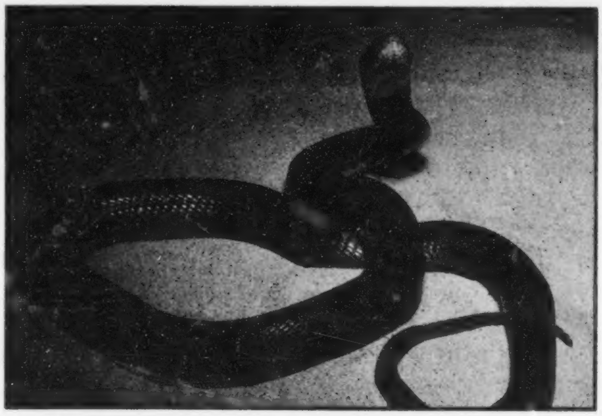
Clinical symptoms — Symptoms (same as for *N. haje* but less serious) include: paralysis of respiratory system with anoxia, vomiting, vertigo, convulsions, drowsiness (closure of upper eyelids); incoordination of speech very common. Death usually caused by respiratory paralysis, shock. Victim can drown in own saliva. Symptoms following venom sprayed into eyes include; painful acute burning sensations, inability to open eyes, copious tear flow, inflammation of membranes around eyes (membranes may develop hemorrhages) keratitis and ulcerations of cornea, may cause blindness. Victims should wash venom from eyes with clean running water, then use one part antivenom diluted with four or five parts water in eyes. Further elaboration of symptoms appears at end of section.

ANTIVENOMS: Possibly effective antivenoms:
BEHR: "Central African", "North and West Africa"
PAST: "Antirept Pasteur", "*Bitis-Echis-Naja*" (if available), "Pasteur Ipser Afrique"
SAIMR: "Polyvalent"



J. Tashjian

Naja mossambica pallida



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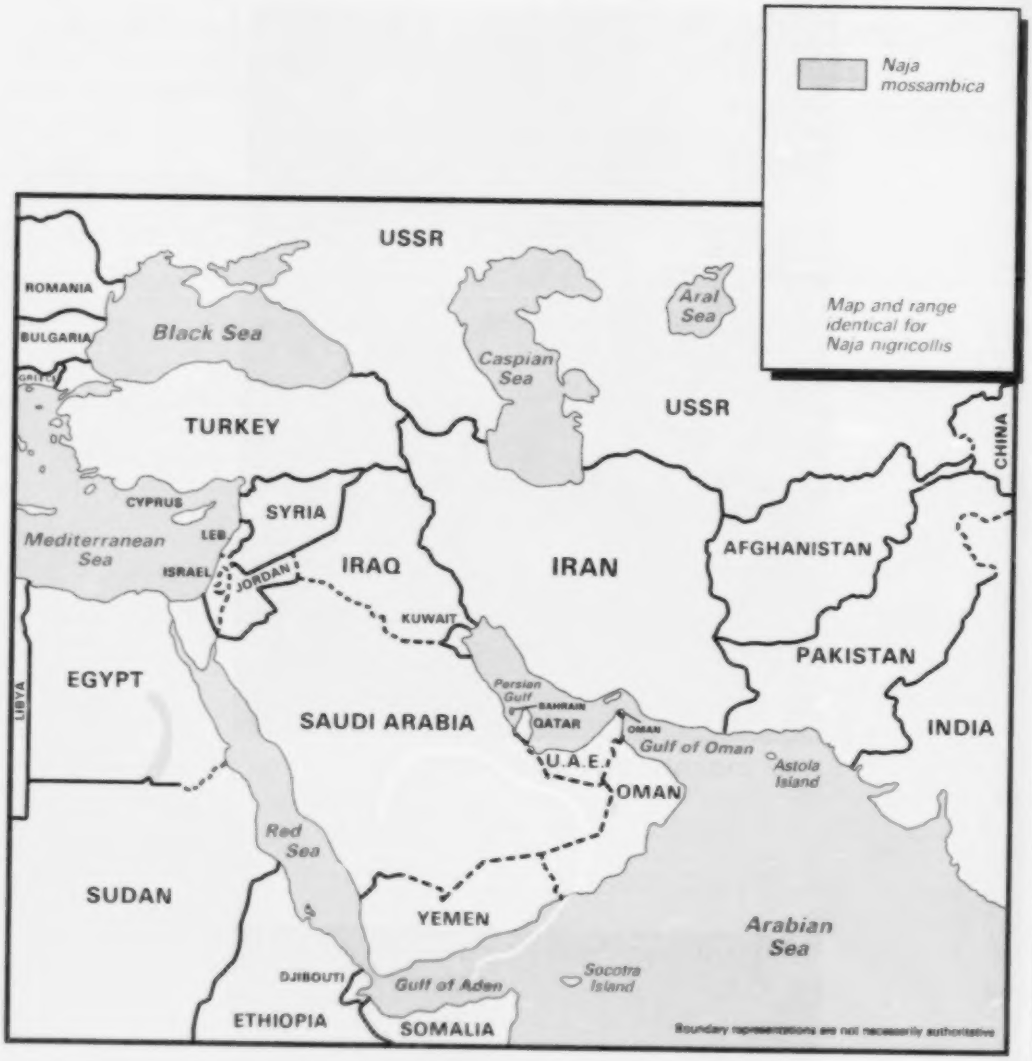
Naja mossambica pallida


▨ Naja mossambica
Map and range identical for Naja nigricollis
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Naja naja - Related Species

RISK CATEGORY II (Moderate Risk). Frequency of envenomation moderate; venom highly toxic.

Species/subspecies/common names —*Naja naja naja*: Asiatic cobra, cobra, common cobra, common Indian cobra, Indian cobra, spectacled cobra (Pakistan) *Naja oxiana*: (formerly known as *Naja naja oxiana*): Central Asian cobra, Oxus cobra (Iran, Afghanistan, Pakistan)

Distribution/habitat — *N. n. naja* found in eastern Pakistan as far west as Karachi. May be found in flat grasslands, among scattered trees, near rice fields and other cultivated areas, near settlements. Usually not found in deserts, rain forests. Occurs at sea level and higher elevations. *N. oxiana*: range includes northeastern Iran, most of Afghanistan, northern Pakistan. Found in mountainous areas at elevations as high as 2,100 meters.

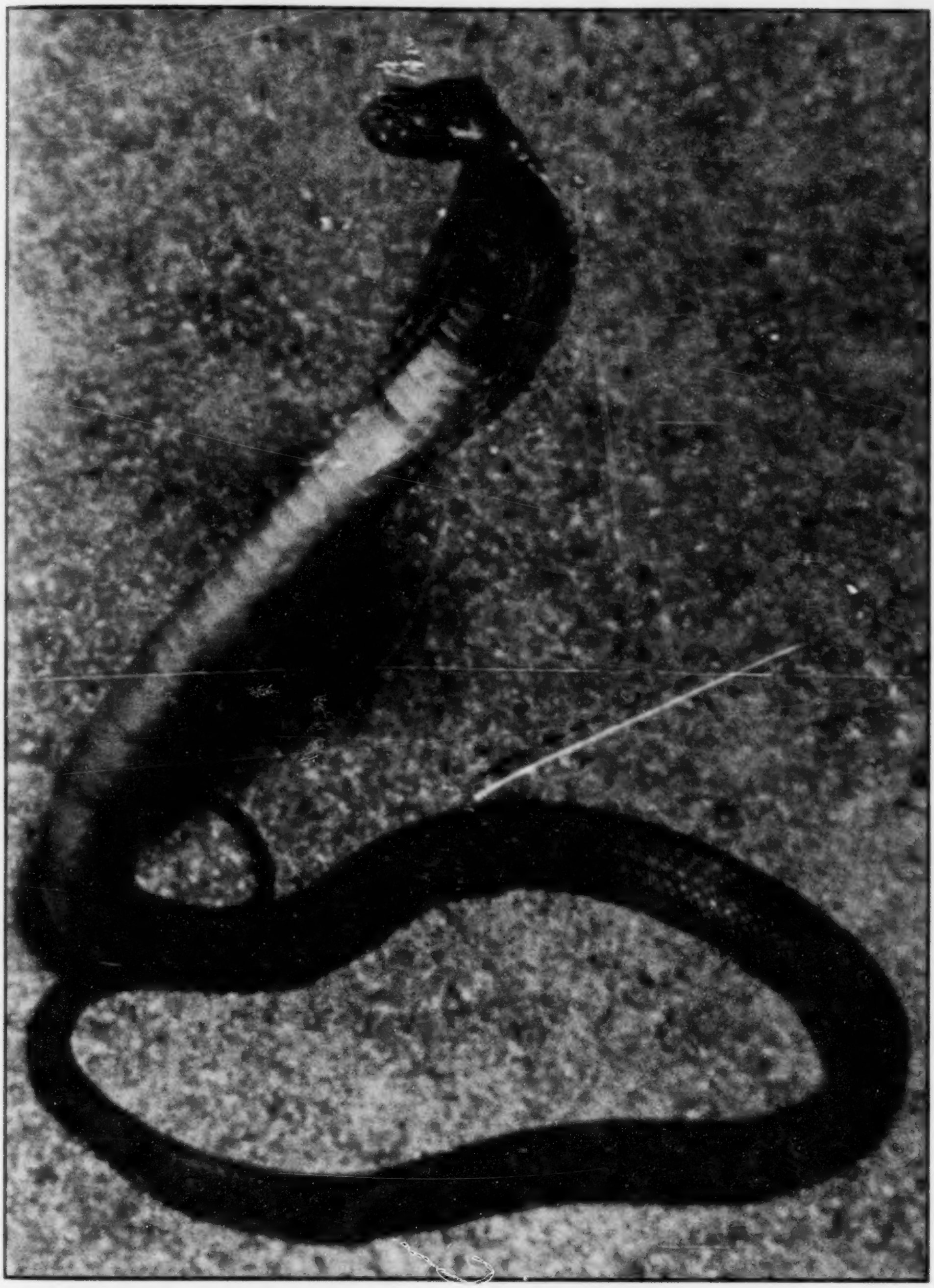
Identification — Both about same size. Average length 1.9 meters; maximum length 2.4 meters. *N. n. naja* has spectacle marking on back of neck (also visible from front on rare specimens). Hood appearance varies greatly. Body coloration yellow to dark brown and black for both sexes. Males generally heavier, shorter than females, but tails longer. *N. oxiana* similar in appearance, but lacks spectacle marking.

Behavior — Diurnal; most active during evening, early morning. May enter human dwellings when hunting. Not considered aggressive; will seek to avoid confrontation with humans. When threatened or cornered, will lift upper body, spread hood. When biting, holds on, chews savagely. May strike repeatedly. Stepping outside radius of raised body portion, remaining motionless, usually results in snake breaking off confrontation, leaving; further movement may provoke bite. Can be exceptionally quick-moving, agile.

Risk — Fangs, venom glands of both species large. Venoms highly toxic and primarily neurotoxic with some anticoagulant and procoagulant properties. Large amounts can be injected in single envenomation.

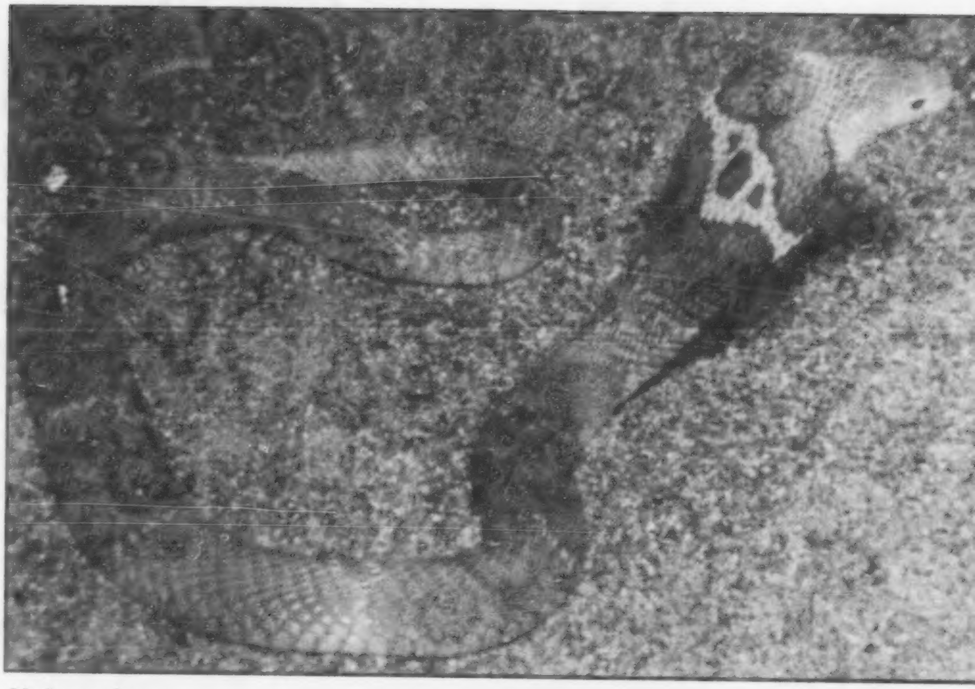
Clinical symptoms — Symptoms may begin approximately 8 minutes after bite. Victim experiences anxiety, the pulse quickens, grows weak, irregular, and envenomated limb may become paralyzed, victim soon falls into deep coma. Pupils react to light to last moment, heart continues beating long after breathing stops. Tongue may swell, impeding breathing. Severe envenomation can produce circulatory shock, initial drop in blood pressure. Less severe envenomation may produce neurotoxic effects, but no changes in cardiovascular activity. Neurotoxic activity affects primarily brain and nerves that control movement. Blood pressure may drop sharply within 1 to 5 minutes, concurrent with respiratory rate increases; breathing rate decreases to complete arrest some 90 to 120 minutes after envenomation. Blood normal until just prior to death. Necrosis at bite site also quite common. Further elaboration of symptoms appears at end of section.

ANTIVENOMS:	Possibly effective antivenoms:
BAND:	Unnamed *Naja naja sputatrix* monovalent
HAFF:	"*Naja*", "Polyvalent Anti-snake Venom Serum"
FITZ:	Unnamed Cobra-*Bitis* polyvalent
IRAN:	"Mono-specific Cobra Antivenom", "Poly-specific"
KASA:	"Polyvalent"
NIH:	"*Naja* monovalent"
PAST:	"Cobra", "Near and Middle East" (if available)
RANG:	"Bivalent" (also known as "Divalent"), "Siamese Cobra"
SAIMR:	"Polyvalent"
TAI:	"*Naja*", "*Naja bungarus*"
TASH:	"Monovalent *Naja naja*", "Polyvalent *Naja* and *Echis*", "Polyvalent *Vipera* and *Naja*"
THAI:	"Cobra"
TWY:	"Snake Anti-venom Twyford (*Naja naja sputatrix*)"

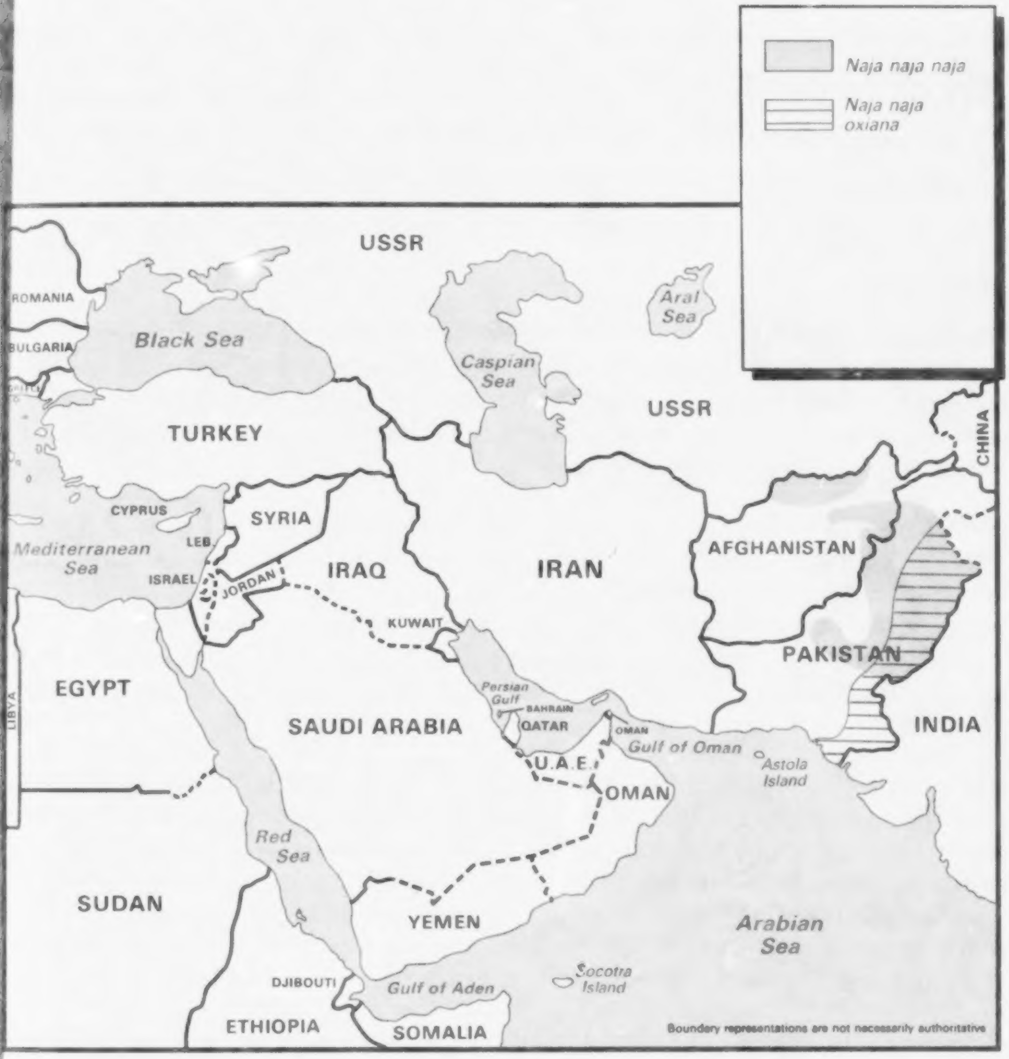


J. Tashjian

Naja naja



Naja naja



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Naja nigricollis

RISK CATEGORY II (Moderate risk). Frequency of envenomation moderate; Venom highly toxic.

Common names — Spitting cobra, black-necked cobra, black-collared cobra, swartneck

Subspecies — None

Distribution/habitat — Found most frequently in Nile valley, primarily south of Asyut. Prefers grassland environment, is strictly terrestrial, lives in lair (rock crevice or burrow formed by rodents or other animals). May occupy same lair for years. During day, may be found basking in vicinity of lair; at night travels afield to hunt.

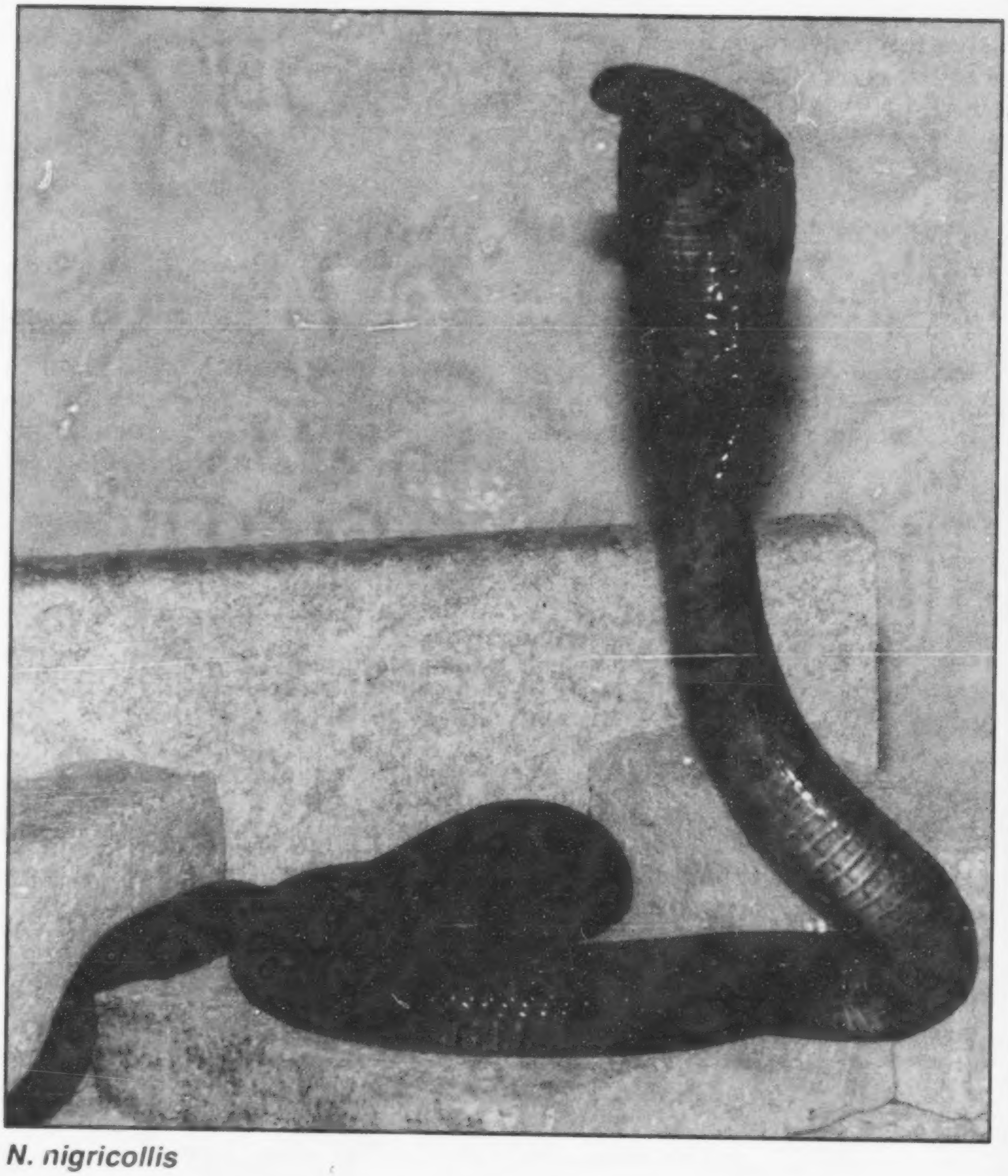
Identification — Average length 1.5 to 2.0 meters; maximum length, 2.3 meters. Dark brown to black. Has broad black band the width of seven or more ventrals under hood, underside entirely black. Hood spread not as pronounced as that of *Naja haje*. Distinctive labial coloration absent. Scales smooth, not as glossy as those of forest cobra. Body color highly variable, ranging from pinkish-tan in some areas, to unicolor black in others. The light areas underneath in those that are black is often pinkish.

Behavior — Rarely attempts to bite unless being handled. Instead, rears up, may raise two-thirds of body off ground, tilts head, spits venom from jets in fangs. Openings in fangs near tip, face directly forward. Not naturally aggressive, but agile. Normally presents little danger during daytime; usually gives ample warning (rears up with spread hood). May "play possum", remaining motionless even when handled. Frequently enters houses at night seeking prey. Bites most frequently at night.

Risk — Venom extremely toxic and primarily neurotoxic with protelytic and anticoagulant properties; snake carries enough venom for four to five lethal doses for humans. Venom expelled at eyes of adversary with surprising accuracy at distances up to 2.5 meters. Fangs long, allowing venom to be introduced into muscle. Snake strikes, then chews on bitten area. Generally raises head to strike with slow weaving motion of upper body.

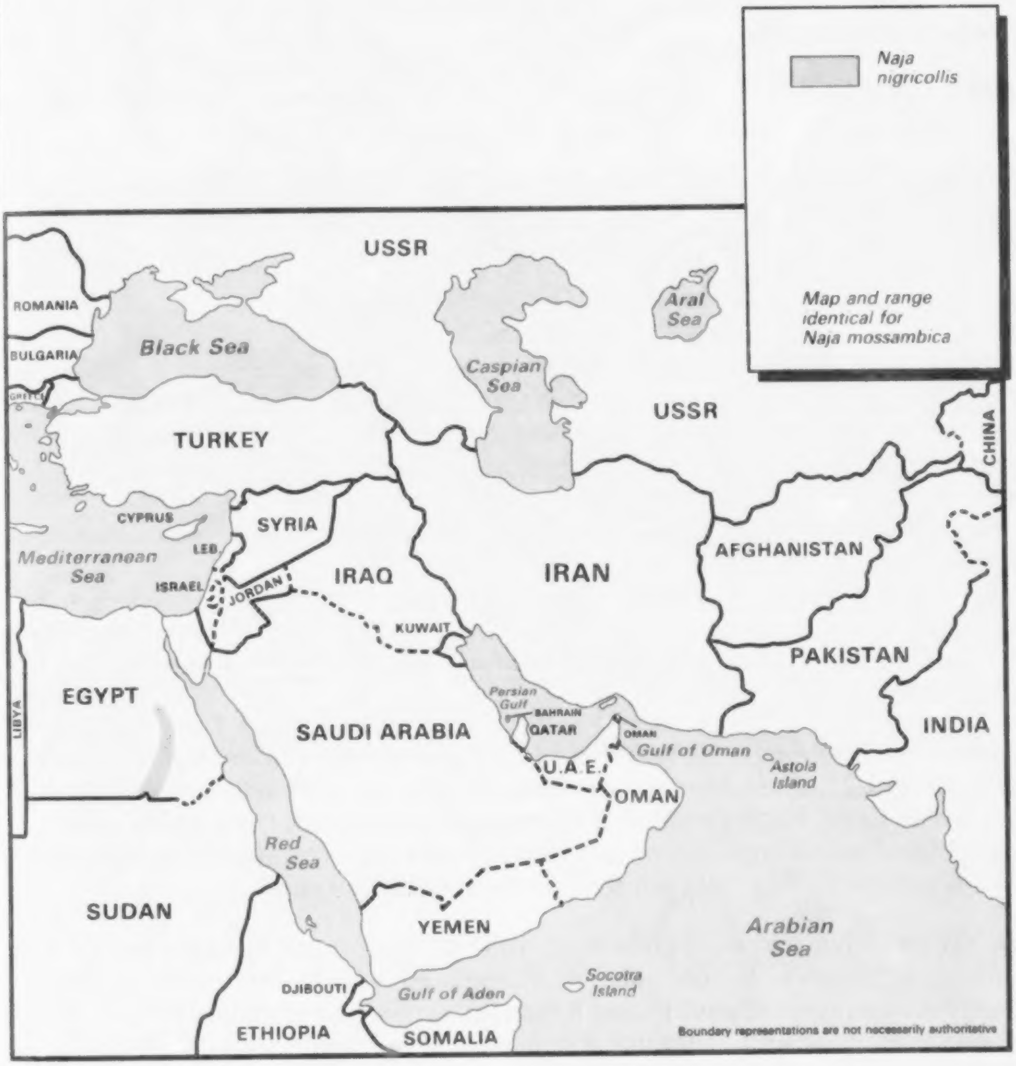
Clinical symptoms — Venom in mucus membrane of eye causes severe pain, photophobia. Eye symptoms usually resolved in 2 or 3 days with no after effects or evidence of absorption, provided eyes well irrigated with water. No antivenom necessary. Symptoms following envenomation include intense reactions at bite site, necrosis; paralysis of respiratory system, with anoxia; vomiting; vertigo; convulsions; drowsiness; closure of upper eyelids; slurred speech; shock, usually preceded by coma. Death usually results from paralysis of respiratory system. Victim may drown in own saliva. Further elaboration of symptoms appear at end of section.

ANTIVENOMS:	Possibly effective antivenoms:
BEHR:	"Central Africa", "North and West Africa"
PAST:	"Antirept Pasteur", "*Bitis-Echis-Naja* (if available), "Pasteur Ipser Afrique"
SAIMR:	"Polyvalent"



D. Kurowski

N. nigricollis



▨ Naja nigricollis
Map and range identical for Naja mossambica
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Walterinnesia aegyptia

RISK CATEGORY II (Moderate risk). Frequency of envenomation moderate; venom highly toxic.

Common names — Black snake, Innes's cobra, desert black snake, Innes's snake, desert cobra, Walter Innes's snake, "happeter hashshahor" (Hebrew), Sinai cobra

Subspecies — None

Distribution habitat — Found in desert areas of northern Egypt, near Nile; the Sinai; along Red Sea coast; the Negev region, southern Israel; western Jordan; Syria; Iraq; Iran. In Saudi Arabia, found in interior plateau east of hills and mountains along Red Sea coast; along Persian Gulf coast near Bahrain; not found in ar-Rub al-Khali, ad-Dahna, an-Nafud, other lifeless desert areas. Also present in Kuwait. Probably present in similar regions of Iraq, but not found in Mesopotamia region. In Iran, found in desert hills of Khuzistan, in foothills of Zagros Mountains at elevations up to 1,000 meters. Primarily a desert species, ranges into adjoining grassland plains or foothills. Seldom found in damp areas. Reports of snake's presence in Lebanon doubtful.

Identification — Average length 0.9 to 1.1 meters; maximum length slightly more than 1.2 meters. Moderately slender. Color glossy black, possibly with brownish tinge. High gloss helps distinguish this species from duller *Naja haje*. Males' tails longer, heads and hoods wider than females'. Hood usually not apparent. Head small, not distinct from neck. Tail short.

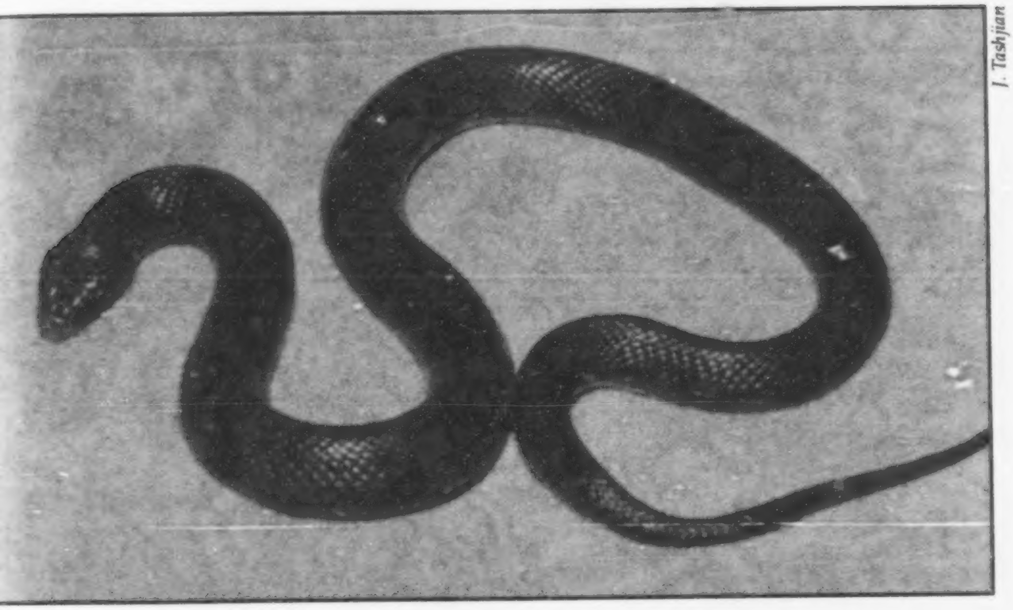
Behavior — Nocturnal, spends much time underground. Eyesight poor. Can be very aggressive. When molested, threatened, or provoked, will hiss violently, strike (generally with closed mouth). Can strike at distances two-thirds its body length. Does not spread a hood or maintain an upright stance.

Risk — Risk moderate, but can be dangerous. Venom highly toxic, but bite victims in Israel, although requiring hospitalization, have recovered without specific antivenom treatment. Only one effective antivenom known to be available.

Clinical symptoms — Venom strongly neurotoxic with lesser anticoagulant activity, causing little local hemorrhage. Symptoms include local pain, swelling, fever, general weakness, headache, vomiting. Further elaboration of symptoms appears at end of section.

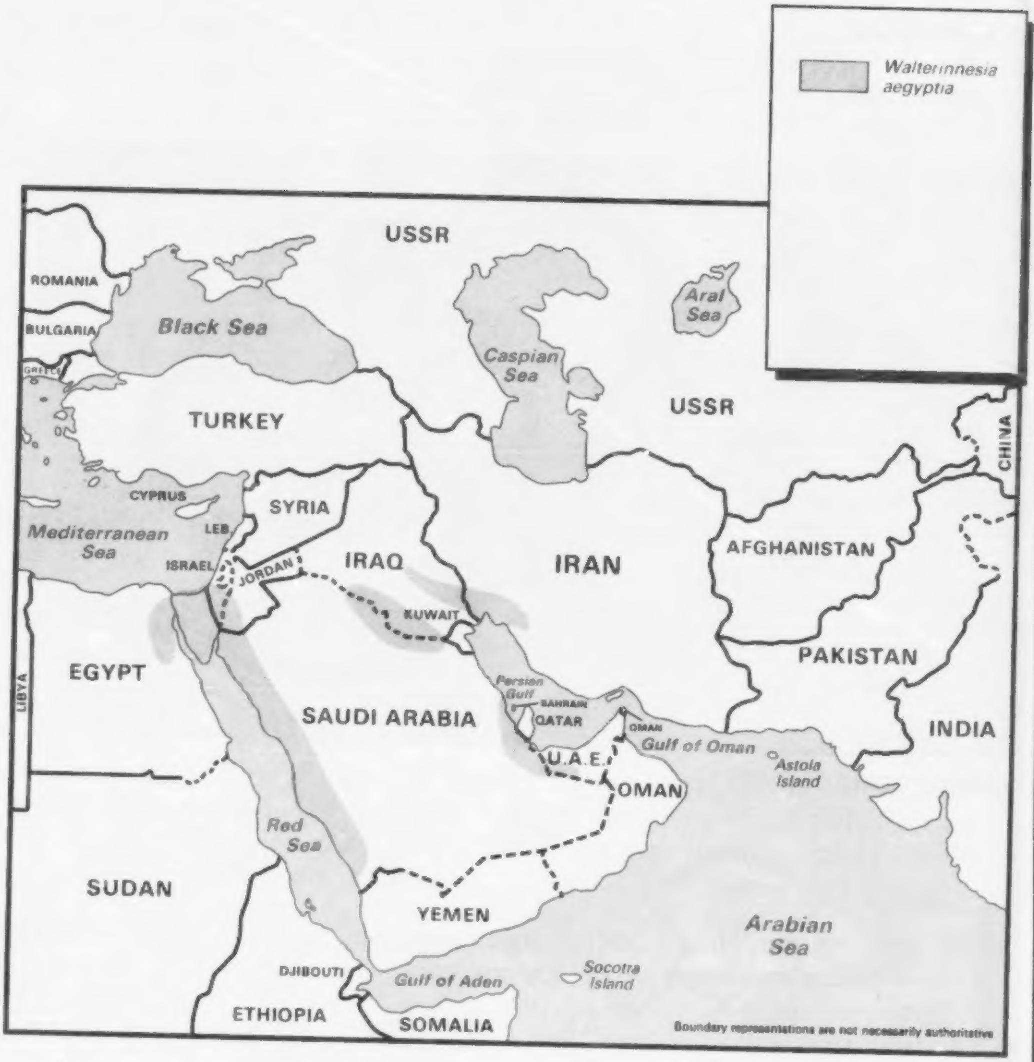
NTIVENOM:

AIMR: "Polyvalent" (Possible effective)



I. Tashjian

Walterinnesia aegyptia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Clinical Symptoms of *Elapidae* Envenomation

The chief activity of most elapid venoms is neurotoxic which, if not neutralized by antivenom, causes a progression of symptoms beginning with euphoria, sometimes described as a "feeling of intoxication" followed by drowsiness and, later, ptosis. Venom also has proteolytic and anticoagulant activity which enhance venom's spread in the tissue.

The time needed for this progression, which varies with location of bite and species of the snake, varies inversely with amount of venom injected. *Bungarus* spp. (kraits) venom may not produce ptosis (drooping of the eyelids) or other systemic symptoms until 8 hours after envenomation; euphoria-drowsiness phases of *Naja* spp. envenomation (cobras) begin after 15 minutes to 5 hours. The ptosis phases appears typically between 1 and 4 hours after envenomation, usually toward the end of the 4-hour period. Because cobras can inject massive amounts of venom, progression of symptoms may be greatly accelerated; the euphoria phase may pass very quickly, go unnoticed; ptosis may quickly follow drowsiness. *Naja naja* venom injected directly into a vein, has caused death within 15 minutes.

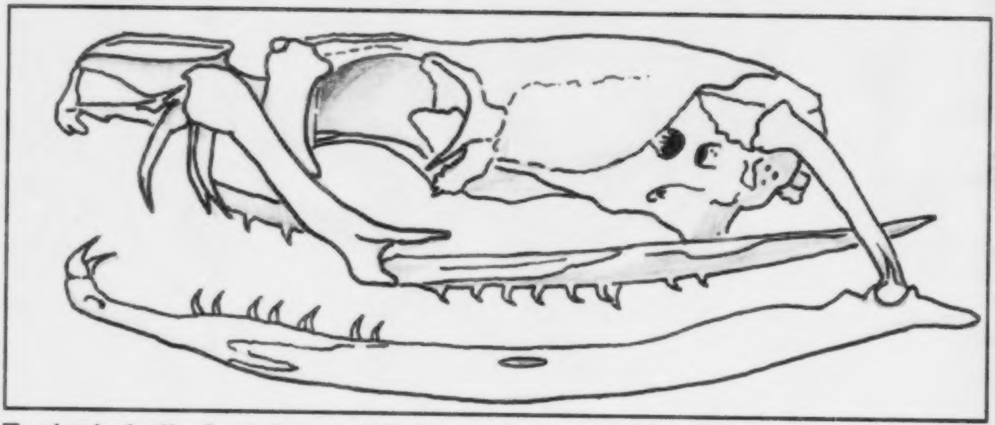
Ptosis may be distinguished from mere drowsiness by victim's inability to raise the eyelids normally. Victim is fully conscious (until respiratory failure induces unconsciousness), but voluntary neuromuscular control of eyelids remains impaired.

Ptosis, the earliest symptom of systemic envenomation, signals a potential medical emergency. Its early recognition and prompt administration of antivenom can forestall development of further adverse neurologic manifestations, which follow quickly. These symptoms may include:

- External ophthalmoplegia, possibly accompanied by impaired eye movement, blurred vision, double vision, dilated pupils.
- Difficulty in speaking, opening mouth, moving lower jaw, sticking tongue out, swallowing.
- Palatal palsy may give speech a nasal resonance; facial palsy may prevent victim from smiling, puffing cheeks, moving lips, wrinkling forehead.
- Flaccid paralysis, resulting in progressive weakening of limbs (victim may be unable to sit up); paresis of neck (so-called "broken neck syndrome").

- Thirst and vomiting (may occur early and continue).
- Increased salivation and swallowing difficulty: the latter may lead to aspiration of accumulated saliva, froth, viscid secretions, or vomit, and rapid death by suffocation ("dry land drowning").
- If suffocation does not occur, breathing difficulty, convulsions, shock, coma, cardiac arrest. *Bungarus* spp.victims may experience severe abdominal pains. *Naja* spp. victims may experience dusky discoloration at bite site, which may spread up an afflicted limb. These symptoms are generally minor, but some *Naja nigricollis, Naja mossambica, Naja naja* envenomations can cause massive swelling.

Section VI.
Snakes of the Family *Hydrophidae*



HCM R.D. Miller, USN

Typical skull of snakes in the families *Elapidae* and *Hydrophidae*

SECTION VI. SNAKES OF THE FAMILY *HYDROPHIDAE*

Astrotia stokesi

RISK CATEGORY II (Moderate risk). Frequency of envenomation, moderate; venom highly toxic.

Subspecies — None

Common names — Large-headed sea snake, Stokes' (also Stoke's) sea snake, Maha valakkadia (Sinhalese)

Distribution/habitat — Found in Arabian Sea, and Gulf of Oman off coasts of Pakistan, Iran, Oman, the United Arab Emirates; not found in Persian Gulf. Occurs at depths of 5 to 10 meters in waters with sandy or coral-covered bottoms; in deeper, open waters, at depths of 20 to 50 meters. Most commonly found along outer reefs where sand coral bottoms come together.

Identification — Average length, 1.4 meters; maximum length, 1.8 meters. Largest, but not longest sea snake. Body circumference may reach 0.3 m. Neck almost as thick as body; head slightly distinct from neck. Head massive, broad. Snout smooth, rounded. Head color olive to yellowish. Long curved teeth extend from upper, lower jaws. Fangs, unlike other sea snakes, quite long.

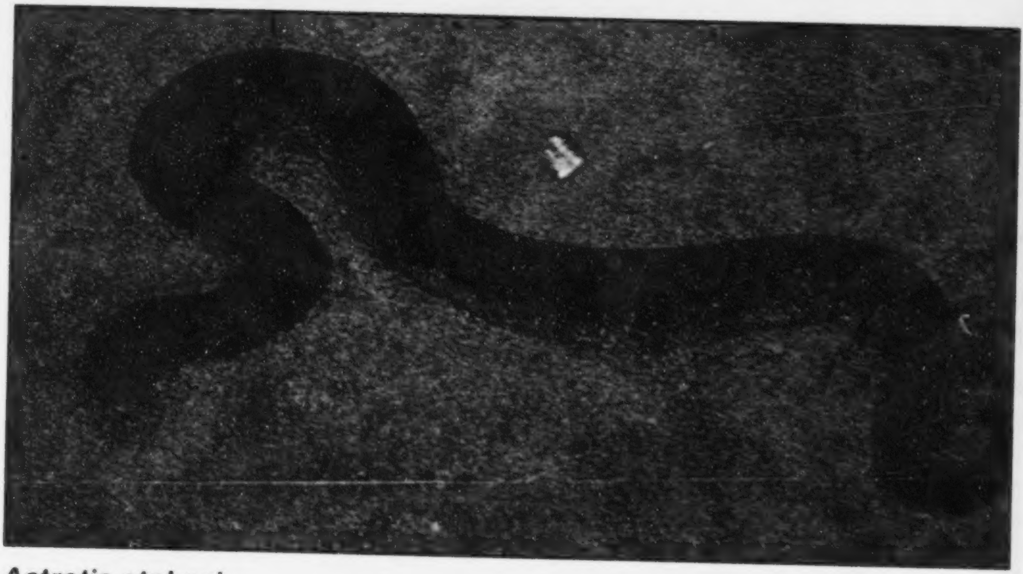
Behavior — Probably both diurnal, nocturnal. Probably most active in early morning hours, seeking prey. Little known about seasonal changes in snake's behavior. Behavior when encountered unpredictable. Normally docile, even when handled. Most bites occur when native fishermen pull them from nets to throw them back into sea. Will bite vigorously to defend self.

Risk — Venom essentially neurotoxic. Few bites reported, none in southwest Asia. Snake rare in this part of world, rarely encountered. Most likely to bite during attempts to handle or capture it. Envenomation can produce severe myotoxic symptoms. Fatal outcome likely if severe envenomation not treated. Because fangs are long, divers' wetsuits do not provide protection that would be provided against smaller species.

Clinical symptoms — Further elaboration of symptoms appears at the end of section.

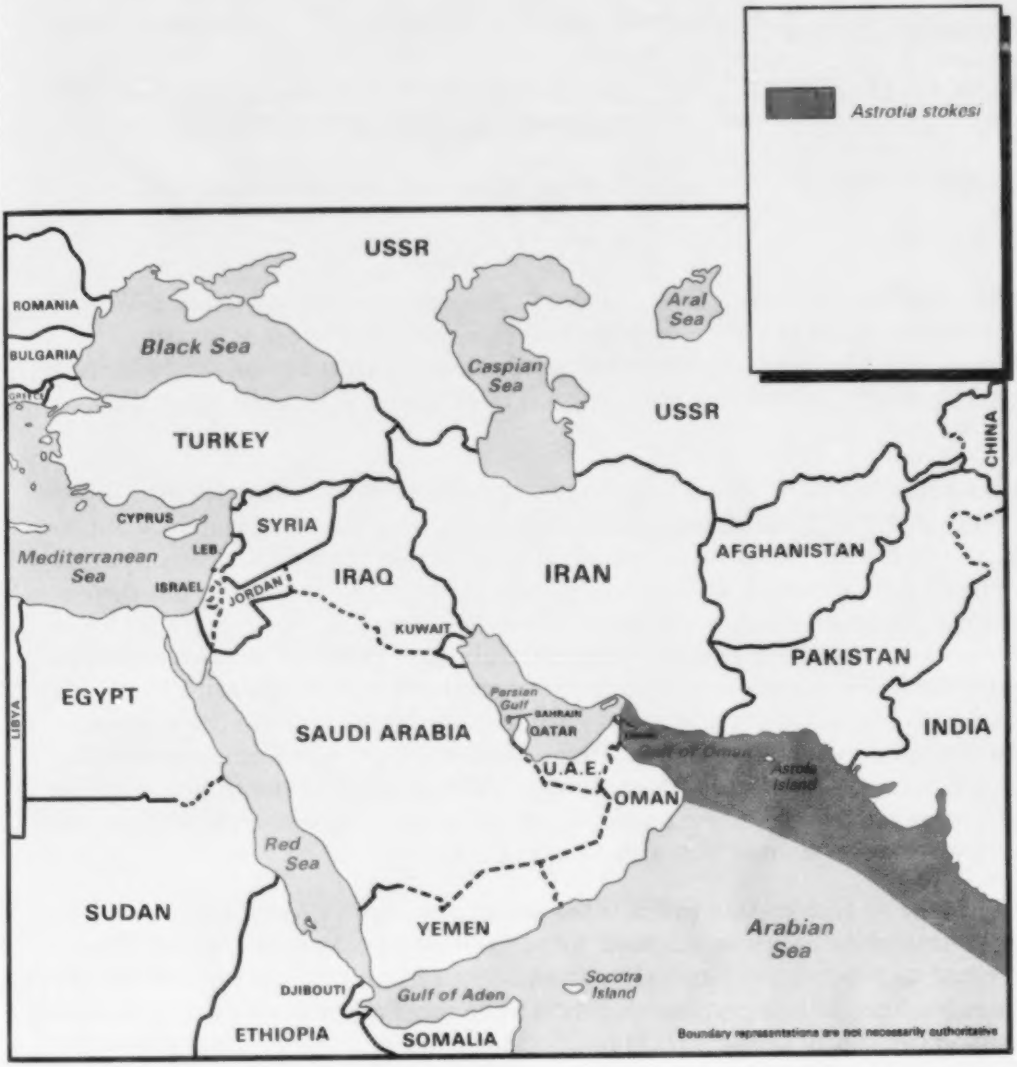
ANTIVENOMS: Specific antivenom not available.

COMM: “Sea Snake” has been shown to be effective in laboratory tests.



W. Dunson

Astrotia stokesi


Astrotia stokesi
USSR
ROMANIA
BULGARIA
GREECE
Black Sea
Caspian Sea
Aral Sea
USSR
TURKEY
CHINA
CYPRUS
SYRIA
LEB.
Mediterranean Sea
ISRAEL
JORDAN
IRAQ
IRAN
AFGHANISTAN
KUWAIT
PAKISTAN
Persian Gulf
BAHRAIN
QATAR
EGYPT
LIBYA
SAUDI ARABIA
INDIA
Gulf of Oman
Astola Island
U.A.E.
OMAN
Red Sea
SUDAN
YEMEN
Arabian Sea
DJIBOUTI
Gulf of Aden
Socotra Island
ETHIOPIA
SOMALIA
Boundary representations are not necessarily authoritative

Enhydrina schistosa

RISK CATEGORY II	(Moderate risk). Frequency of envenomation moderate; venom highly toxic.
Common names —	Beaked sea snake, common sea snake
Subspecies —	None

Distribution/habitat — One of most widely distributed sea snakes. Very common in Gulf of Oman and Arabian Sea, very rare west of Straits of Hormuz in Persian Gulf. Found in shallow waters muddy or sandy bottoms. Quite plentiful at mouths of rivers, has been found upstream in various places.

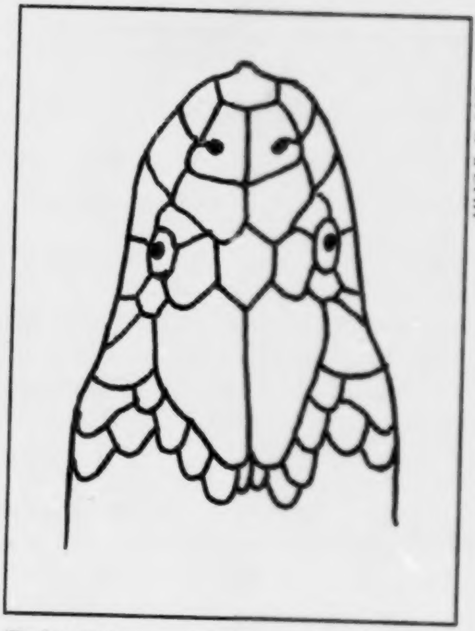
Identification — Average length 0.9 to 1.2 meters; maximum length, slightly less than 1.5 meters. Males smaller than females. Body moderately stout, vertically flattened. Head rather small, slightly wider than neck. The upper part of head dark greenish without markings, underside pale. Snout has downturned tip, gives snake a characteristic beaked profile. Nostrils are on top of the snout. Topside of adults uniformly dull olive green or pale greenish gray, with dark crossbands that tend to fuse together toward tail. Tail usually mottled with black. Underside, sides vary in color from cream to dirty white. Young specimens olive or gray above, with dark gray or black crossbands along back. Crossbands widest along backbone, often come to point on sides. On some specimens, these markings encircle body. Newborn young are milk white with crossbands that almost encircle body.

Behavior — Not known to leave the water voluntarily. Very awkward, but not completely helpless, on land. Reports of aggressiveness conflict. Described as much more aggressive than other sea snakes, but reportedly never bites humans unless provoked. Tends to be most aggressive during breeding season (probably January to May). Probably not aggressive, unless restrained. Most bite victims are fishermen bitten while working. Risk to swimmers negligible, but waders likely to be bitten if they step on snake. Snake grasps, holds onto victim, chews when biting. Bite feels like pinprick.

Risk — A dangerous species. Venom primarily myotoxic and neurotoxic. Although not all bites result in envenomation. Responsible for more serious/fatal bites than all other sea snakes combined. Venom is one of most toxic of sea snake venoms. Its abundance near bathing beaches, and fishing villages increases likelihood of encounters, and serious envenomations.

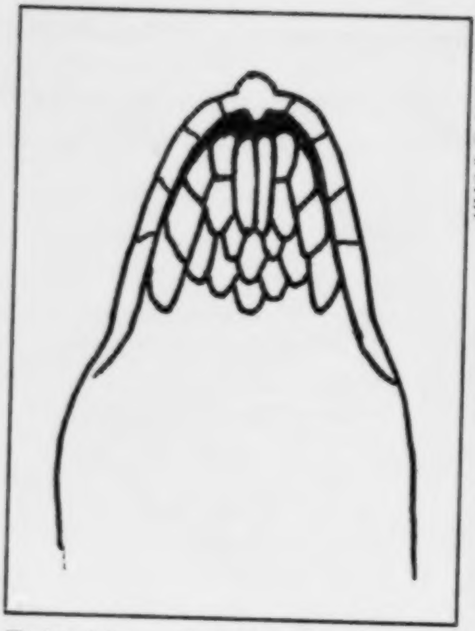
Clinical symptoms — Symptoms of envenomation appear at end of section.

ANTIVENOMS: Known to be effective:
COMM: "Sea Snake"



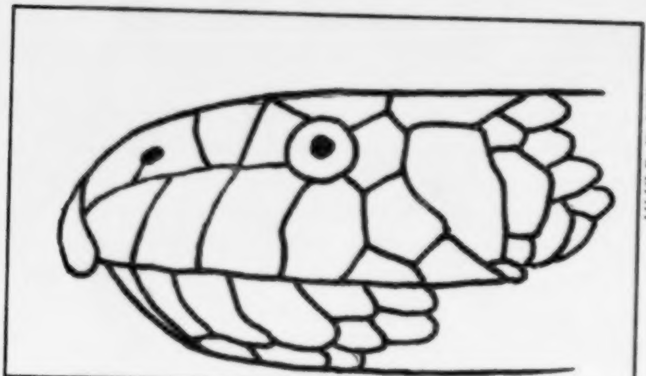
IIMC R. D. Miller, USN

Enhydrina schistosa; **head, dorsal view**



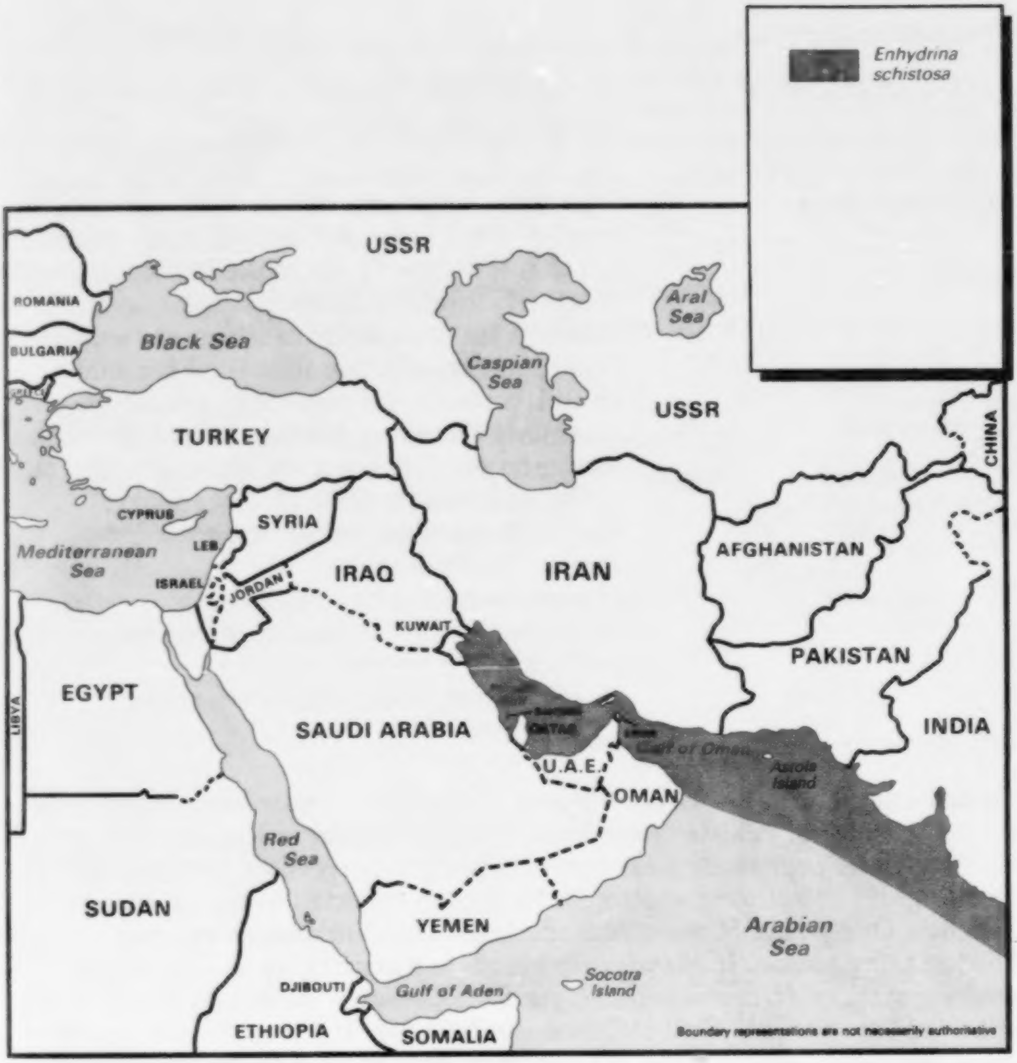
IIMC R. D. Miller, USN

Enhydrina schistosa; **head, ventral view**



IIMC R. D. Miller, USN

Enhydrina schistosa; **head, lateral view**



Enhydrina schistosa
USSR
ROMANIA
BULGARIA
Black Sea
Caspian Sea
Aral Sea
USSR
TURKEY
CHINA
CYPRUS
SYRIA
LEB
Mediterranean Sea
ISRAEL
JORDAN
IRAQ
IRAN
AFGHANISTAN
KUWAIT
PAKISTAN
EGYPT
LIBYA
SAUDI ARABIA
QATAR
INDIA
Gulf of Oman
Astola Island
U.A.E.
OMAN
Red Sea
SUDAN
YEMEN
Arabian Sea
DJIBOUTI
Gulf of Aden
Socotra Island
ETHIOPIA
SOMALIA
Boundary representations are not necessarily authoritative

Hydrophis species

RISK CATEGORY II (Moderate risk). Frequency of envenomation, moderate; venom highly toxic.

Common names — *Hydrophis caerulescens*: banded sea snake, bluish small-headed sea snake, chittul, many-toothed sea snake, Merram's sea snake *Hydrophis cantoris* (Formerly know as *Microcephalophis cantoris*): Cantor's small-headed sea snake, sea snake *Hydrophis cyanocinctus*: annulated sea snake, chittul, common sea serpent *H. gracilis* (Formerly known as *Microcephalophis gracilis*): common small-headed sea snake, graceful sea snake, graceful small-headed sea snake, narrow-headed sea snake *H. lapemoides*: Persian Gulf sea snake
H. mamillaris: Bombay Sea Snake
H. ornatus: Gray's sea snake, ornate sea snake, reef sea snake, spotted sea snake
H. spiralis: sea snake, yellow sea snake

Subspecies — none

Distribution/habitat — *H. caerulescens, H. cantoris, H. mamillaris*: found only off the seacoast of Pakistan from India-Pakistan border to Karachi. Found in shallow water near shore, near bottom among rock crevices, coral boulders, or pilings. *H. caerulescens* specimens have been collected in coastal mangrove swamps; One young *H. mamillaris* specimen found in mangrove creek. During rainy season, *H. caerulescens* breeds in estuaries, generally among sheltering rocks. *H. cyanocintus, H. gracilis, H. ornatus, H. sprialis*: found along coasts of Persian Gulf, Gulf of Oman, Arabian Sea. H. cyanocinctus: one of most commonly encountered sea snakes in Persian Gulf. *H. ornatus*: rare in Persian Gulf, but one of most wide-ranging species; has been identified in Gulf as far west as Shatt al-Arab, Iraq. *H. lapemoides*; has been found in fresh water; *H. gracilis, H. ornatus*: found in shallow, brackish waters along seacoasts, near heavily populated areas as well as in sand along coasts, and in estuaries. Very rarely, *H. cyanocinctus, H. lapemoides* known to crawl on land. *H. spiralis* found in deep water.

Identification — Generally all *Hydrophis* species have small heads, short fangs, slender necks, bodies which become thicker toward vertically flattened thick tails. The heads of H. cantoris, *H. gracilis* are tiny, with necks, forward parts of bodies very long, slender; rear body parts 3 to 5 times thicker than neck. All species have dark crossbands, sometimes completely encircling body. Underside coloration usually lighter than that of topside. Young specimens (some species) often have yellow horseshoe-shaped mark on top of head. Mark fades, or may disappear, as snake matures. Other identifying characteristics:

Chart II
Identifying Characteristics for the Hydrophis Species of Southwest Asia

Snake	Length	Topside	Head	Variations in Young Specimens
H. caerulescens	0.7 m. avg. 0.8 m. max	Bluish-gray with bluish-black or dark purple crossbands	Dark gray	Sometimes yellow mark on head
H. cantoris	1.1-1.4 m.avg 1.9 m. max	Forward: olive to yellow; rear: dark olive; black stripe along backbone; yellowish on sides; with gray to black crossbands	Olive	None recorded
H. cyanocinctus	1.4-1.7 m. avg. 1.9 m. max	Dirty white	Pale gray	Pale greenish
H. gracilis	0.8-0.9 m. avg. 1.1 m. max	Forward: black to dark olive with white or yellow spots or crossbands, rear: greenish-gray, pale yellow, or white with darker crossbands; or uniform gray	Black to dark olive	Forward: black with whitish or yellow oval spots; rear: crossbands

Chart II
Identifying Characteristics for the Hydrophis Species of Southwest Asia

Snake	Length	Topside	Head	Variations in Young Specimens
H. lapemoides	0.9 m. avg. 1.1 m.max	Yellow to olive or gray shading into white on sides with olive to black crossbands that may encircle body	Olive, sometimes with yellow mark on top	Yellow mark on head
H. mamillaris	0.8 m.avg. 0.9 m. max.	White or light gray with black crossbands; sometimes black stripe along backbone	Black	White with dark crossbands
H. ornatus	0.7-0.9 m.avg. 1.3 m. max.	Dark gray, pale greenish-white, olive or yellow with dark gray crossbands or diamond-shaped spots	Olive	Sometime yellow mark on head
H. spiralis	1.7-1.8 m. avg. 2.7 m. max.	Golden yellow, yellow-green, or olive with black crossbands that may encircle body	Yellow	Head black with yellow mark on top

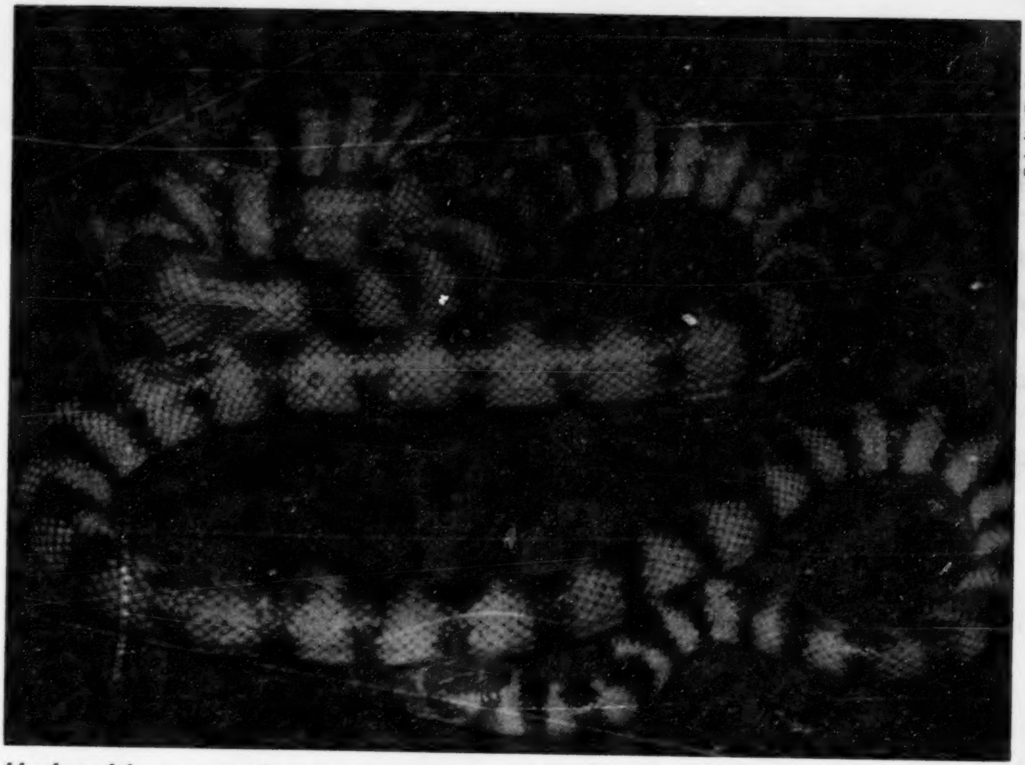
Behavior — *Hydrophis* species generally diurnal and nocturnal. May be attracted to surface lights at night. Most plentiful during rainy season (approximately March to May) when large numbers come together in estuaries to breed. Generally not aggressive, but may become more aggressive during breeding season, at which time most bites occur. Likely to bite if molested, grasped, or stepped on. When biting, they grasp victim, hold on, chew.

Risk — Venoms highly toxic and primarily neurotoxic; untreated serious envenomation likely to be fatal. *H. cyanocinctus, H. spiralis* have caused numerous human fatalities. Both comparatively larger than other sea snakes, likely to inject more venom into victim. Several factors reduce danger from these snakes:

- Some species, (e.g., *H. caerulescens, H. cantoris, H. mamillaris, H. ornatus* rare, or have very limited range in southwest Asia.
- Are unaggressive. Most bites result from attempts to handle.
- Mouths are small; snakes must grasp, chew to cause serious envenomation.
- Fangs are short; clothing, boots, divers' wetsuits may prevent their penetrating skin.
- Bite may not envenomate. If snake has recently injected most of its venom while capturing prey, it cannot envenomate until venom replenished. It is estimated that 3 out of 4 bites cause no envenomation, and only 17 percent of bites cause death.

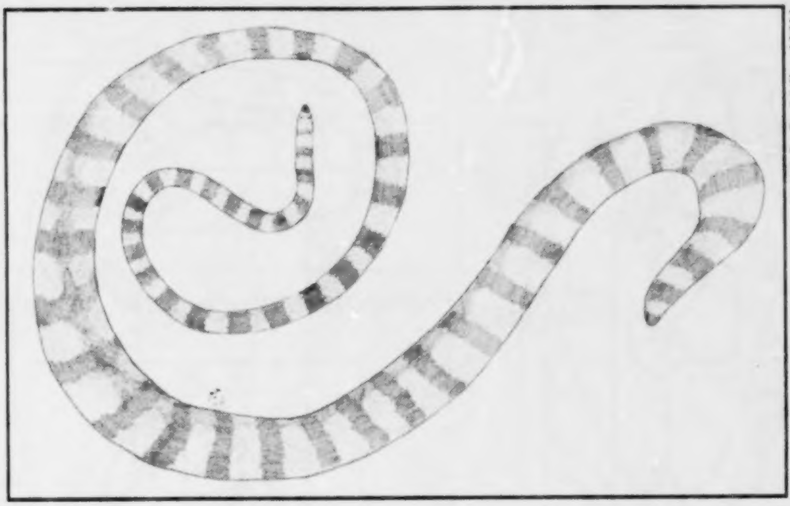
Clinical symptoms — Symptoms of envenomation appear at end of section.

ANTIVENOMS:	Known to be effective for several *Hydrophis* spp., mabe effective for all.
COMM:	"Sea Snake"



Hydrophis cyanocintus

F. bolin/D. Hamper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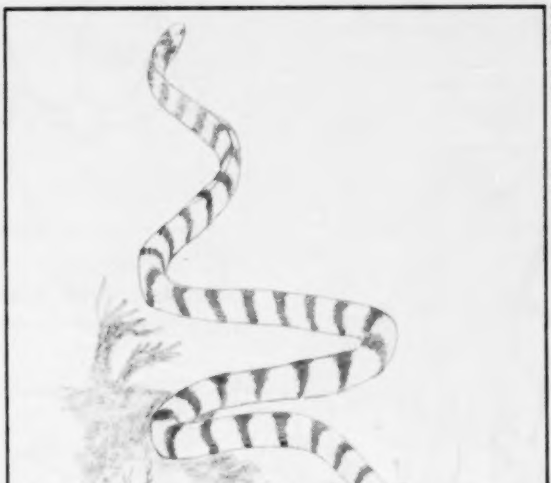
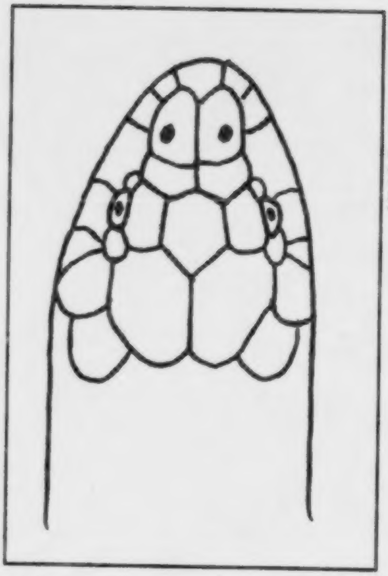
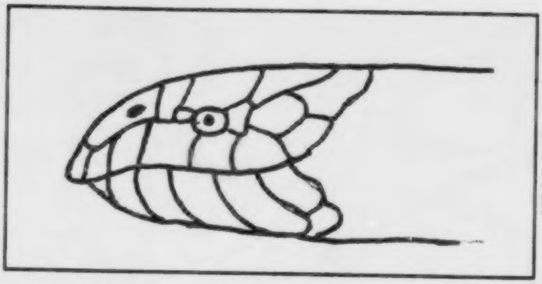
Hydrophis gracilis


HMC R. D. Miller, USN

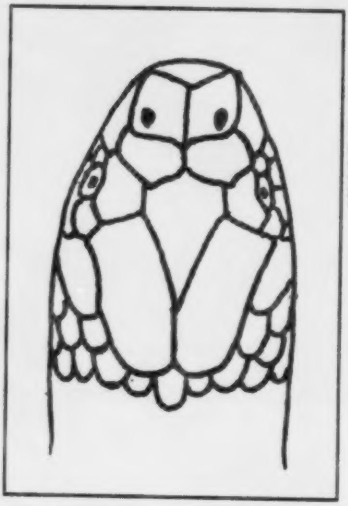
Hydrophis spiralis



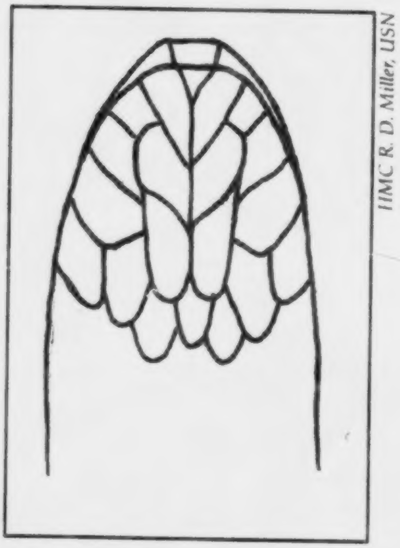
Hydrophis cantoris; **head, dorsal view**



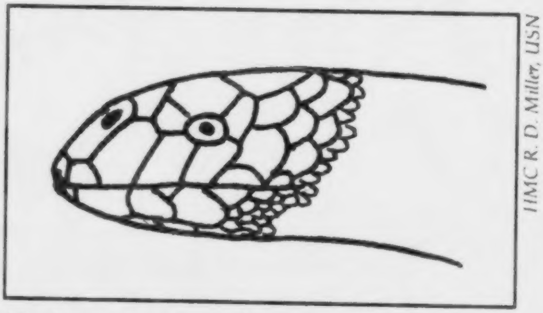
Hydrophis cantoris; **head, lateral view**



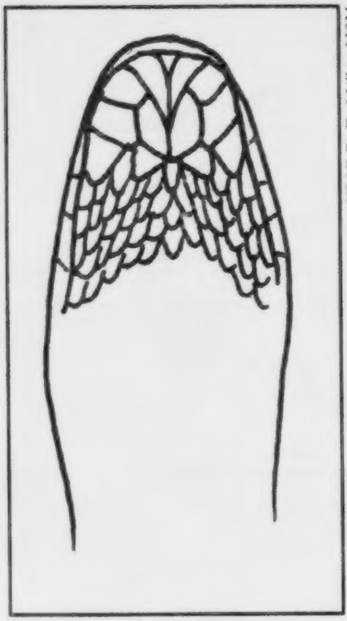
Hydrophis caerulescens; **head, dorsal view**



Hydrophis cantoris; **head, ventral view**

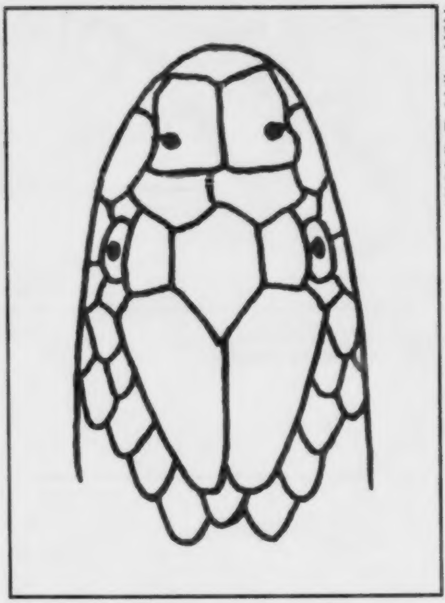


Hydrophis caerulescens; **head, lateral view**



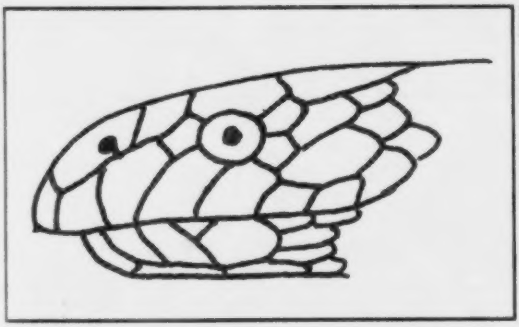
HMC R. D. Miller, USN

Hydrophis caerulescens; **head, ventral view**



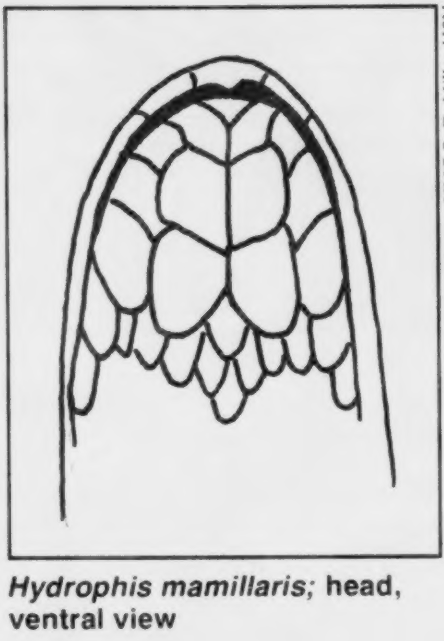
HMC R. D. Miller, USN

Hydrophis mamillaris; **head, dorsal view**



HMC R. D. Miller, USN

Hydrophis mamillaris; **head, lateral view**



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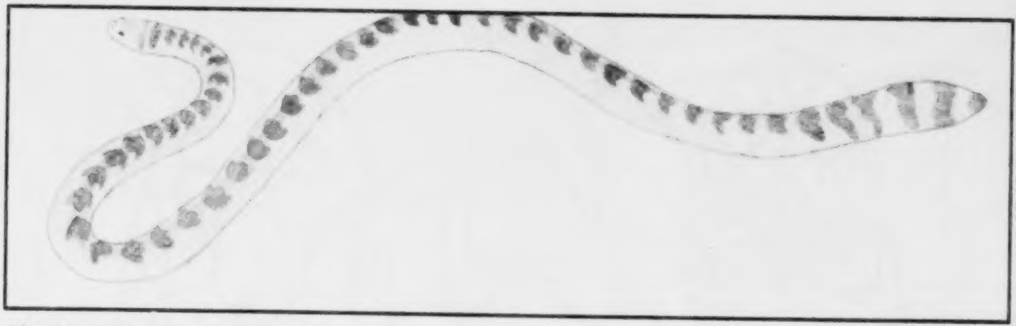
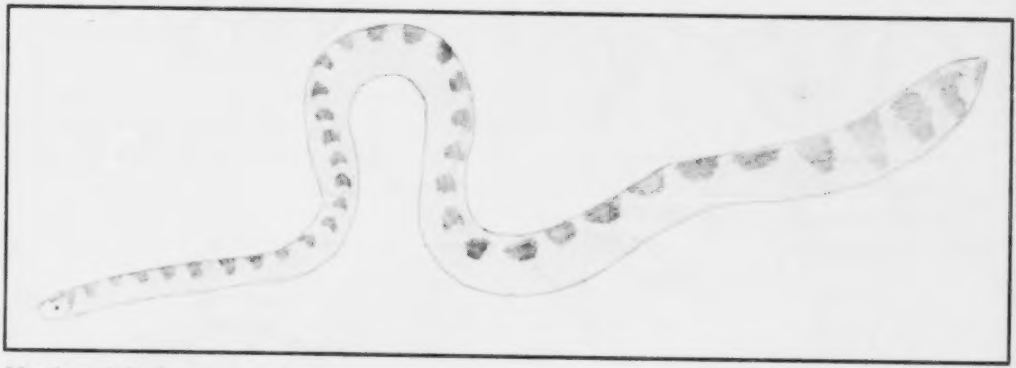
Hydrophis mamillaris; **head, ventral view**



HMC R. D. Miller, USN

Hydrophis ornatus



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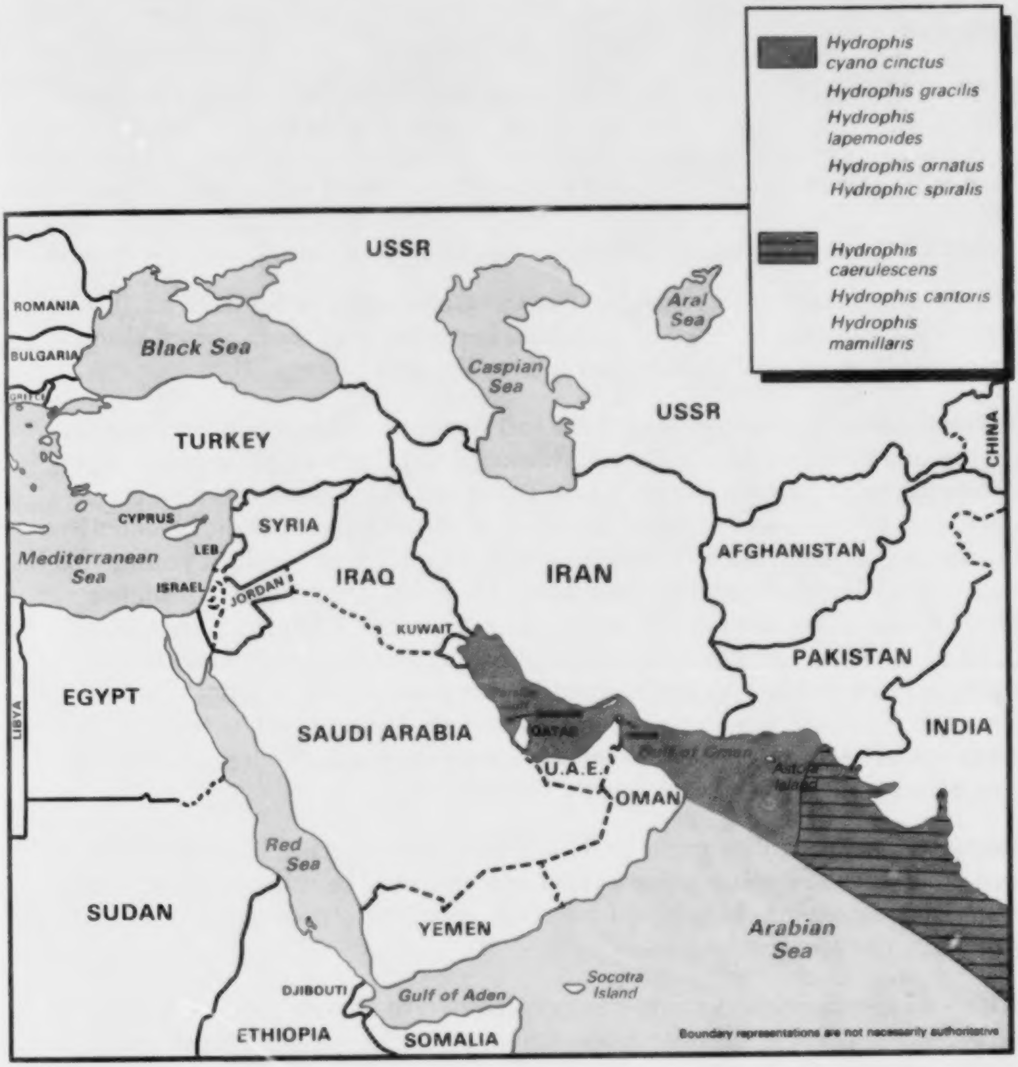
Hydrophis lapemoides


Hydrophis cyano cinctus
Hydrophis gracilis
Hydrophis lapemoides
Hydrophis ornatus
Hydrophic spiralis
Hydrophis caerulescens
Hydrophis cantoris
Hydrophis mamillaris
USSR
ROMANIA
BULGARIA
Black Sea
Caspian Sea
Aral Sea
GREECE
TURKEY
USSR
CHINA
CYPRUS
SYRIA
Mediterranean Sea
LEB.
ISRAEL
JORDAN
IRAQ
IRAN
AFGHANISTAN
KUWAIT
PAKISTAN
EGYPT
LIBYA
SAUDI ARABIA
QATAR
Gulf of Oman
Astola Island
INDIA
U.A.E.
OMAN
Red Sea
SUDAN
YEMEN
Arabian Sea
DJIBOUTI
Gulf of Aden
Socotra Island
ETHIOPIA
SOMALIA
Boundary representations are not necessarily authoritative

Lapemis curtus

RISK CATEGORY II (Moderate risk). Frequency of envenomation moderate; venom highly toxic.

Common names — Shaw's sea snake, short sea snake

Subspecies — None

Distribution/habitat — Found in Persian Gulf (rarely in western half), Arabian Sea. Common in Strait of Hormuz. Reportedly fairly common along Baluchistan coast off Pakistan, but rare at Karachi.

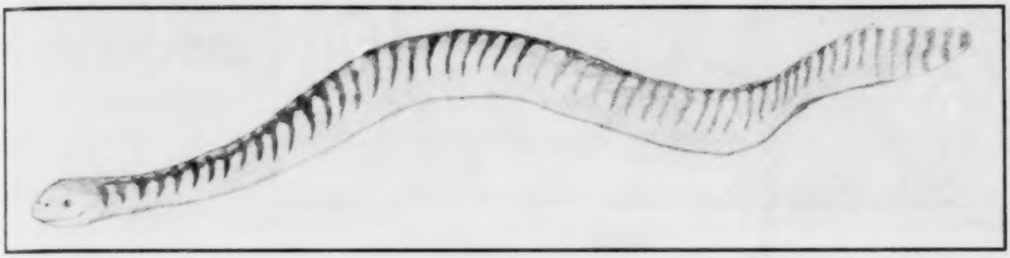
Identification — Average length 0.8 to 1.0 meters. Body short, stout, cylindrical toward head, vertically flattened toward tail. Topside olive green, lightens to white or pale yellow on sides. Tip of tail black. Back has numerous dark, greenish-brown, or greenish-black, indistinct crossbands, broader than the spaces between them. First crossband is on back of head. In young specimens, these bands extend further down the sides, often form complete rings. Head massive, somewhat flattened, varies from olive to gray in adults. Top of head dark gray or olive, darker in young specimens. A yellow curved mark may be present on top of head. Snout is moderate in length, broadly rounded. Eye size moderate, iris dull greenish. Upper jaw has three to five teeth widely separated from fangs. Fangs small, fixed, fragile, usually hidden by a tissue sheath. Neck hardly evident.

Behavior — Probably similar to that of *Hydrophis* species. Probably both diurnal, nocturnal. Probably not aggressive, but may be more aggressive during breeding season. May bite if handled, restrained, provoked. When biting, holds on, chews.

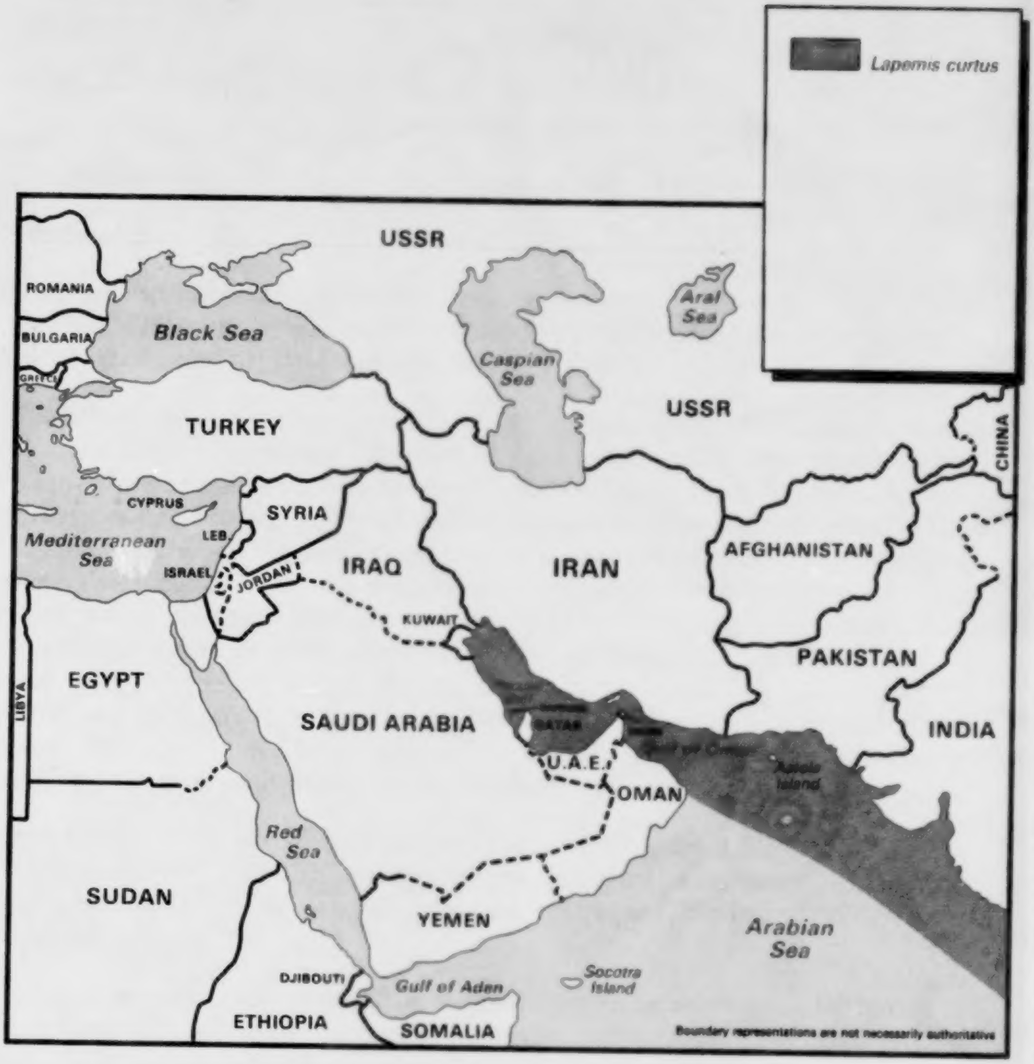
Risk — *Lapemis curtus* venom has been shown to be more toxic than that of *Hydrophis* spp. on small mammals; however, snake seldom encountered, so risk to humans moderate.

Clinical symptoms — Symptoms of envenomation appear at end of section.

ANTIVENOMS: Specific antivenom not available;
COMM: "Sea Snake" may be effective


IIMC R. D. Miller, USN

Lapemis curtus


Lapemis curtus
USSR
ROMANIA
BULGARIA
GREECE
Black Sea
Caspian Sea
Aral Sea
USSR
TURKEY
CHINA
CYPRUS
SYRIA
LEB.
Mediterranean Sea
ISRAEL
JORDAN
IRAQ
IRAN
AFGHANISTAN
KUWAIT
PAKISTAN
EGYPT
LIBYA
SAUDI ARABIA
QATAR
INDIA
Gulf of Oman
Astola Island
U.A.E.
OMAN
Red Sea
SUDAN
YEMEN
Arabian Sea
DJIBOUTI
Gulf of Aden
Socotra Island
ETHIOPIA
SOMALIA
Boundary representations are not necessarily authoritative

Pelamis platurus

RISK CATEGORY II	(Moderate risk). Frequency of envenomation moderate; venom highly toxic.
Common names —	Black and yellow sea snake, yellow-bellied sea snake, pelagic sea snake
Subspecies —	None

Distribution/habitat — Range wide, includes Persian Gulf, Arabian Sea, waters off southern coast of Arabian peninsula. Rarely found in Persian Gulf. Most plentiful in clear, warm, shallow waters where surf and currents weak, but also may be found far out at sea. Cannot survive on land.

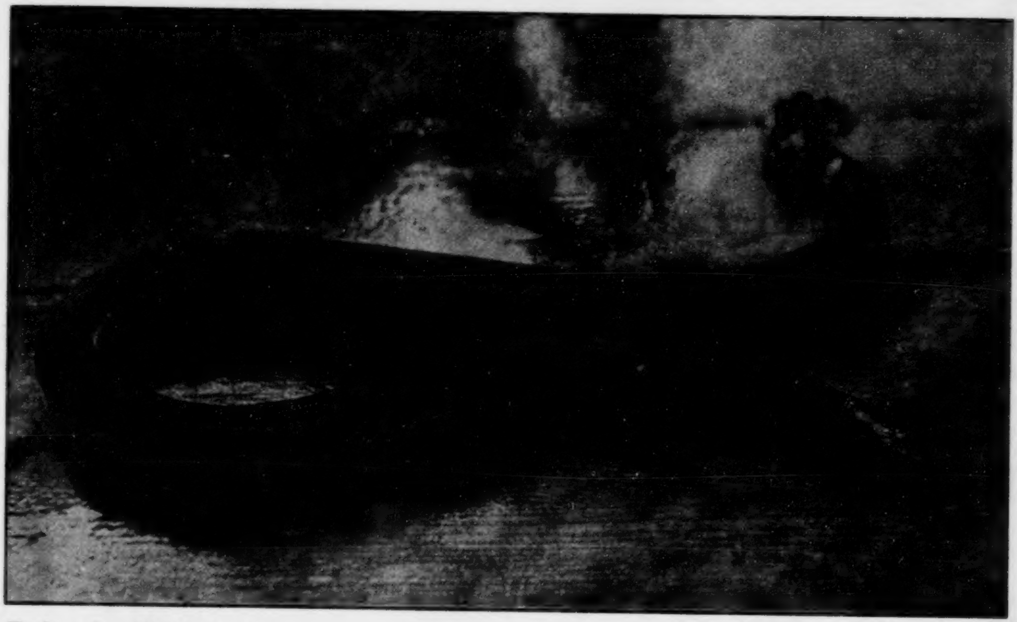
Identification — Average length, 0.6 to 0.8 meters; maximum length, 1.1 meters. Females may be somewhat larger than males. Body vertically flattened. Topside black or dark brown; underside, sides, yellow, yellowish brown, or light brown. Boundary between dark and light areas sharply defined. This coloring extends full length of snake, from snout to tail. Head long, narrow, flattened, with narrow, blunt, rounded snout. Eye size moderate, pupils round. Fangs small. Top of head dark, sides yellow. Top of tail dark; may be mottled or broken into dark spots or bars, or may be solid black or brown.

Behavior — Probably both diurnal, nocturnal. Agile swimmer, but hardly moves on land. Often seen floating on ocean surface. Reports of aggressiveness conflict; probably will bite if handled, restrained, provoked. May be more aggressive during breeding season. When biting, holds onto victim, chews.

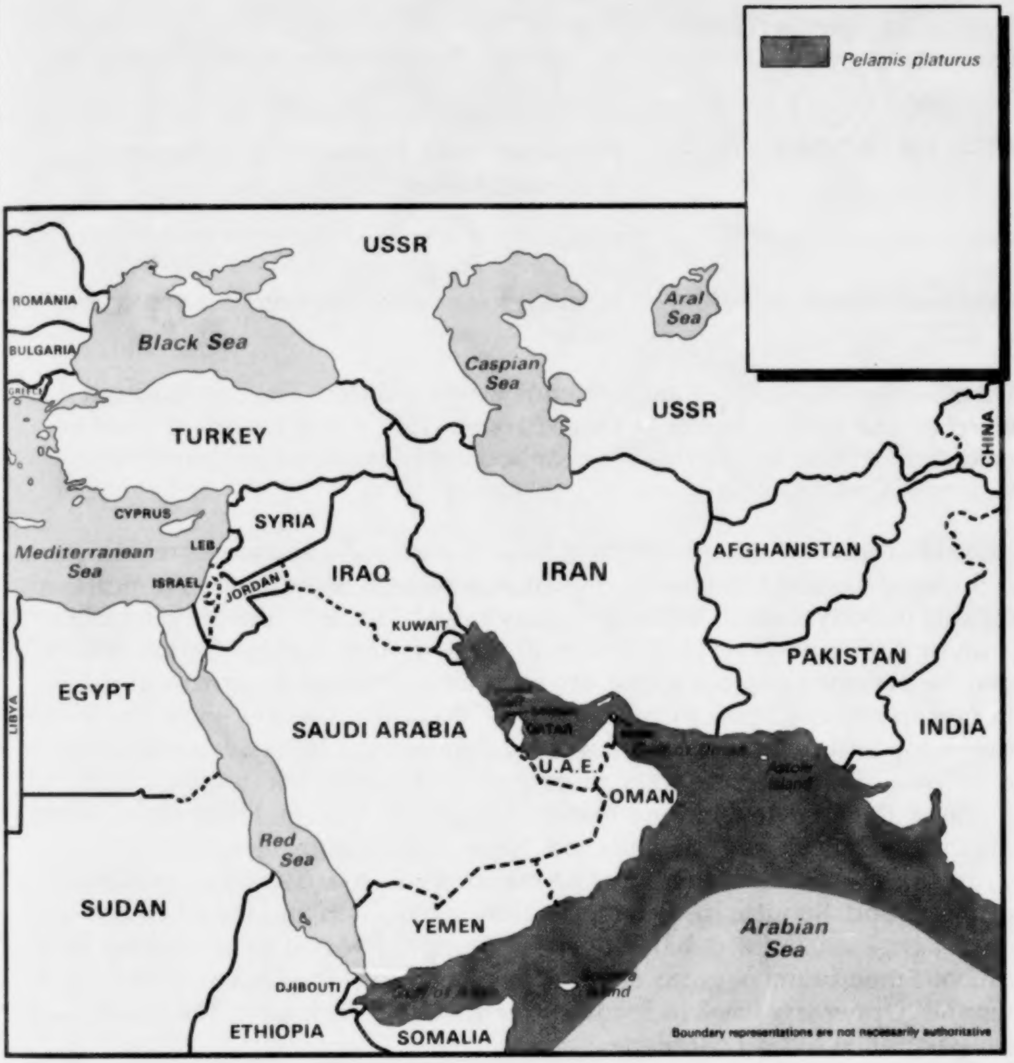
Risk — The most wide-ranging, most frequently encountered sea snake with highly toxic venom. Although risk of serious envenomation by this snake is higher than many other sea snakes, few, if any, deaths have been attributed to it.

Clinical symptoms — Symptoms of envenomation, appear at end of section.

ANTIVENOMS:	Specific antivenom not available;
COMM:	"Sea snake" may be effective.



Pelamis platurus



▨ Pelamis platurus
USSR
ROMANIA
BULGARIA
GREECE
Black Sea
Caspian Sea
Aral Sea
USSR
CHINA
TURKEY
CYPRUS
SYRIA
LEB.
Mediterranean Sea
ISRAEL
JORDAN
IRAQ
IRAN
AFGHANISTAN
KUWAIT
PAKISTAN
EGYPT
LIBYA
SAUDI ARABIA
QATAR
U.A.E.
OMAN
INDIA
Astola Island
Red Sea
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YEMEN
Arabian Sea
DJIBOUTI
ETHIOPIA
SOMALIA
Boundary representations are not necessarily authoritative

Praescutata viperina (Lapemis viperina)
Formerly known as *Thalassophina viperina, Thalassophis viperina, Thalassophis viperinus.*

RISK CATEGORY II	(Moderate risk). Frequency of envenomation moderate; venom highly toxic.
Subspecies —	None
Common names —	Schmidt's sea snake, viperine sea snake, sea snake

Distribution/habitat — Range extends westward from Far East through Arabian Sea and Gulf of Oman as far as Persian Gulf. A few found off coast of Pakistan. Reports of its presence near Socotra Island (part of Yemen near Gulf of Aden) doubtful.

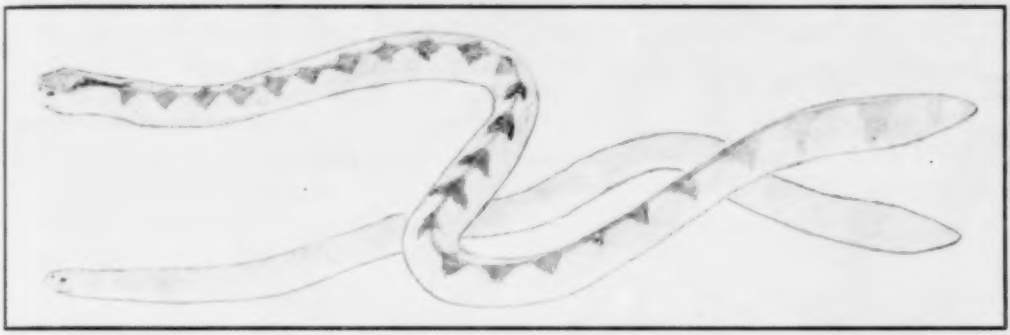
Identification — Average length, 0.8 to 0.9 meters. Body moderately thick, cylindrical toward head; vertically compressed, thicker toward tail. Scales on topside of body keeled, forming slightly raised "spine". Topside gray, olive gray, or dark blue-gray. Dark brown or black diamond-shaped spots which may be present along backbone, are wide along backbone, narrow at sides. In rare specimens, spots form crossbands. Body sides yellow-gray. Border between top and underside scales sharply delineated. Underside scales are undivided. Color patterns darker, more vivid in younger specimens; snake matures, the topside diamond marking may fade, vanish. Head short, broad, distinct form neck, slightly flattened. Neck slightly more slender than body. Crown of head dark or black has no markings. Eye size small or moderate, pupils round. Snout rounded, moderately sized. Chin and throat cream-colored. Fangs small, fixed, barely visible on upper jaw and easily hidden by a mucous membrane of gums until snake bites. Fangs fragile, can break off in wound. Upper jaw has 3 to 5 smaller teeth behind each fang. Tail black, vertically flattened like an oar blade.

Behavior — Probably both diurnal, nocturnal. May be attracted to light at night. Probably unaggressive; people have been bitten. Little information available on biting actions. If, however, its attack is similar to that of other sea snakes, probably grasps victim, holds on, chews in order to embed fangs into victim's skin. This behavior likely because the fangs are small, fragile.

Risk — Venom highly toxic, can cause death; however, snake generally is nonaggressive, which lessens some what the risk of serious envenomation.

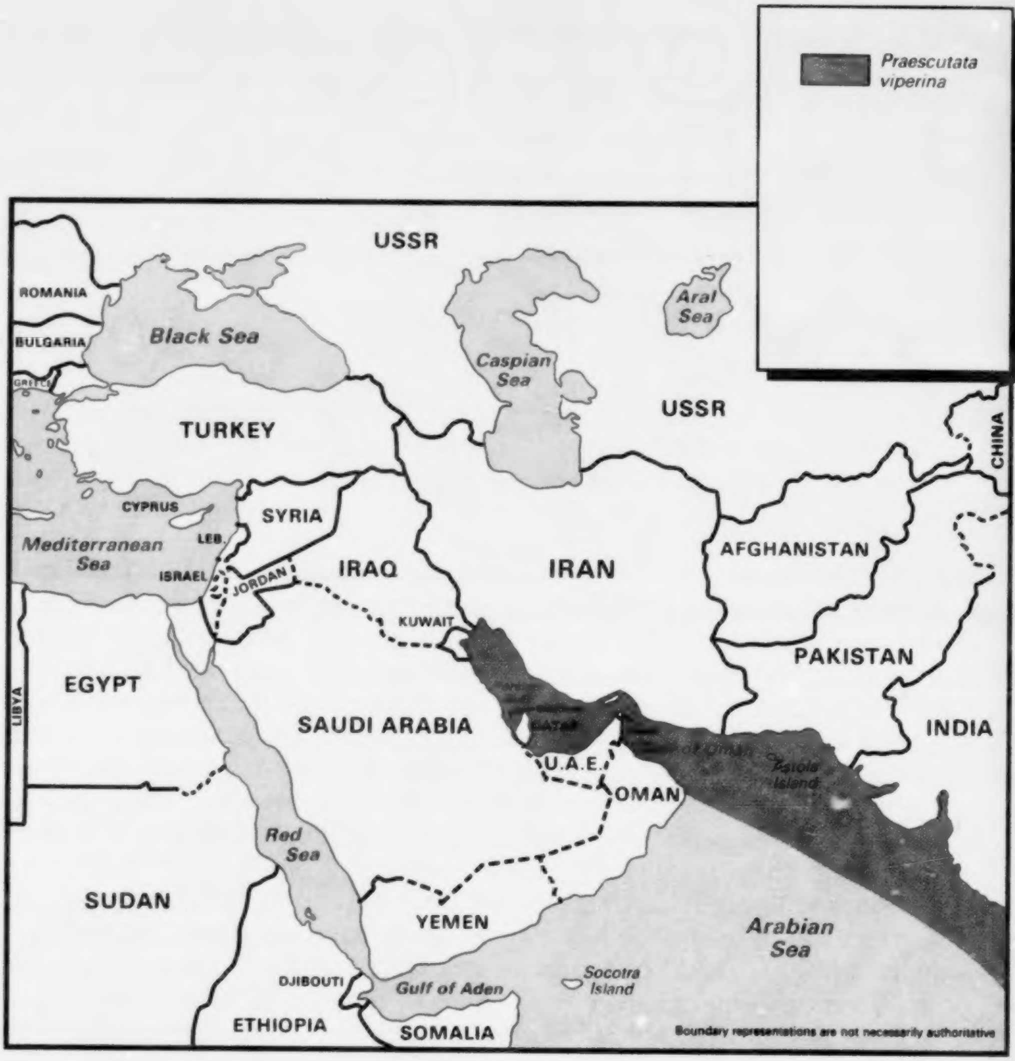
Clinical symptoms — Symptoms of envenomation, appear at end of section.

ANTIVENOMS:	Specific antivenom not available;
COMM:	"Sea Snake" may be effective



HMC R. D. Miller, USN

***Praescutata viperina*; two color phases**


▨ Praescutata viperina
USSR
ROMANIA
BULGARIA
GREECE
Black Sea
Caspian Sea
Aral Sea
USSR
CHINA
TURKEY
CYPRUS
SYRIA
Mediterranean Sea
LEB.
ISRAEL
JORDAN
IRAQ
IRAN
AFGHANISTAN
KUWAIT
PAKISTAN
EGYPT
LIBYA
SAUDI ARABIA
QATAR
U.A.E.
INDIA
Gulf of Oman
Astola Island
OMAN
Red Sea
SUDAN
YEMEN
Arabian Sea
DJIBOUTI
Gulf of Aden
Socotra Island
ETHIOPIA
SOMALIA
Boundary representations are not necessarily authoritative

Clinical Symptoms of *Hydrophidae* Envenomation

The chief activity of sea snake venoms on humans is myotoxic; they destroy the skeletal voluntary muscle fibers, but do not directly affect cardiac muscle or smooth muscle. Neurotoxic components coexist with the myotoxic components in different proportions for different species. Usually the myotoxic effects predominate. When the myotoxins destroy the muscle fibers, muscle aches and paralysis occur; myoglobin is produced and enters the urine, coloring it dark brown (myoglobinurea). As severe myotoxic actions progress, muscle pains become extreme.

The neurotoxic components interrupt neuromuscular transmission by binding to the muscle receptor or by blocking the release of the neurotransmitter. Respiratory paralysis (possibly leading to death) can result from the myotoxic or neurotoxic action.

Sea snake bites cause little or no pain. Any pain that is felt feels like a slight pinprick. Usually no subsequent pain, swelling, necrosis, or skin discoloration develops at bite site, so symptoms must be carefully monitored to determine whether or not envenomation has occurred. Shock or fright can produce symptoms even when there has been no envenomation. Victim may collapse, appear to be semiconscious, have cold clammy skin, a feeble pulse, and rapid, shallow breathing. A placebo injection often will alleviate these symptoms; in any event, the symptoms will subside in time.

The latent period before symptoms develop after envenomation varies from 0.5 to 3.5 hours, depending on the amount of venom received, location of the bite, and health of the victim. In cases of severe envenomation, symptoms will begin no later than 2 hours after bite.

Envenomation may produce various sets of symptoms:

- Massive envenomation (occurs vary rarely), causing rapid collapse or shock (not to be confused with ordinary fainting, which sometimes occurs after a bite).
- Less severe envenomation (most cases) chiefly affects muscles. Within first 30 minutes, muscle aches and stiffness occur (first in neck, throat, tongue, shoulders, trunk, or limbs, but soon becomes generalized). Other early symptoms may include headache, constant thirst, episodic sweating. After 1 or 2 hours, muscle pain may become moderate to severe if limbs are moved, even passively by an outside force. Victim able to move voluntarily, but movement is painful. (If neurotoxic action

predominated, victim would be unable to move). Drowsiness, vomiting, disturbed vision, and ptosis (drooping eyelids) also may appear. After about 3 to 6 hours, myoglobinuria occurs and the muscle enzyme, creatine kinase, is released. Clinical manifestations of cerebral, cerebellar, or extra pyramidal involvement are not observed.

- If antivenom not administered at first appearance of symptoms, victim likely to become progressively paralyzed (flaccid paralysis) to the point of complete immobility and respiratory distress. The combination of glossopharyngeal palsy with subsequent aspiration of vomit and saliva can cause early respiratory failure. Respiratory failure from muscle weakness may occur within a few hours or up to 2 days after envenomation. Shortly before this occurs, victim becomes drowsy, then comatose. The pupils dilate and no longer respond to light. Some victims may go into hyperkalemic cardiac arrest (sometimes mitigated by dialysis); others may die from acute renal failure (the usual cause of death after 48 hours). Some survivors of serious envenomation, especially those not receiving antivenom, may suffer permanent skeletal muscle and kidney damage.
- Antivenom can arrest neuromuscular damage, even if it is not used until hours or days after envenomation, but antivenom will not reverse damage already done. "Sea snake" antivenom, made by Australia's Commonwealth Serum Laboratories from *Enhydrina schistosa* venom (one of the most toxic), is the only available antivenom for sea snakes.

Appendices

Appendix A

Antivenoms Available For Use Against Snakes of the Middle East

Snake	Known to Be Effective		Possibly Effective	
Atractaspis engaddensis	None			
Atractaspis microlepidota	None			
Bitis arietans	BEHR:	"Central Africa" "North and West Africa"		
	FITZ:	Unnamed Cobra-*Bitis* polyvalent		
	PAST:	"Antirept Pasteur" "*Bitis-Echis-Naja*" (if available) "Pasteur Ipser Afrique"		
Cerastes cerastes	BEHR:	"Near and Middle East" "North and West Africa"	IRAN:	Poly-specific
	PAST-ALG:	"Antiviperin"	PAST:	"Near and Middle East"
	SAIMR:	"*Echis*"		
Cerastes vipera	BEHR:	"North and West Africa"		
	PAST:	"Near and Middle East" (if available)		
	SAIMR:	"*Echis*"		
Echis carinatus	BEHR:	"Near and Middle East" "North and West Africa		
	HAFF:	"*Echis*" "Polyvalent Anti-snake Venom Serum"		
	IRAN:	"Monospecific *Echis* Antivenom" Poly-specific		
	KASA:	"Polyvalent"		
	NIH:	"Anti-snake Venom Serum" "Polyvalent" "*Echis* Monovalent"		

Appendix A (Continued)
Antivenoms Available For Use Against Snakes of the Middle East

Snake	Known to Be Effective		Possibly Effective	
Echis carinatus	PAST:	"Antirept Pasteur" "*Bitis-Echis-Naja*" (if available) "Near and Middle East" (if available) "Pasteur Ipser Afrique"		
	SAIMR:	"*Echis*"		
	TASH:	"Monovalent *Echis carinatus*" "Polyvalent *Naja* and *Echis*"		
Echis coloratus	ROGO:	"Arabian *Echis*"	Antivenoms known to be effective for *Echis carinatus*	
	SAIMR:	"*Echis*		
Echis multisquamatus			Antivenoms known to be effective for *Echis carinatus*	
Eristicophis macmahoni	IRAN:	Poly-specific		
Pseudocerastes persicus	IRAN:	"Mono-specific Persica Antivenom" Poly-specific		
Vipera albicornuta			*BEHR:*	"Europe" "Near and Middle East"
			CZECH:	"Venise"
			IRAN:	Poly-specific
			PAST:	"Near and Middle East" (if available) "Pasteur Ipser Europe"
			ROGO:	"Palestine Viper"
			SCLA:	"Antiviperin"
			YUGO:	"Antiviperinum"
Vipera ammodytes	BEHR:	"Europe" "Near and Middle East"		
	BULG:	"Unnamed *Vipera ammodytes* monovalent"		
	CZECH:	"Venise"		
	PAST:	"Pasteur Isper Europe"		
	SCLA:	"Antiviperin"		

Appendix A (Continued)
Antivenoms Available For Use Against Snakes of the Middle East

Snake	Known to Be Effective		Possibly Effective	
Vipera ammodytes	YUGO:	"Antiviperinum"		
Vipera barani			Antivenoms known to be effective or possibly effective for *V. albicornuta* envenomation	
Vipera bornmuelleri			Antivenoms known to be effective or possibly effective for *V. albicornuta* envenomation	
Vipera bulgardaghica			Antivenom known to be effective or possibly effective for *V. albicornuta* envenomation	
Vipera kaznakovi			BEHR:	"Europe"
			SCLA:	"Antiviperin"
Vipera latifii	IRAN:	"Mono-specific *Latifii* Antivenom"	Antivenoms known to be effective or possibly effective for *V. albicornuta* envenomation	
Vipera lebetina	BEHR:	"Europe" Near and Middle East" "North and West Africa"		
	IRAN:	"Mono-specific *Lebetina* Antivenom"		
	PAST:	"Antirept Pasteur" "Near and Middle East" (if available)		
	PAST-ALG:	"Antiviperin"		
	TASH:	"Monovalent *Vipera lebetina*" "Polyvalent *Vipera* and *Naja*"		
Vipera palaestinae	IRAN:	"Poly-specific"	Antivenoms known to be effetive or possible effective for *V. albicornuta* envenomation	
	ROGO:	"Palestine viper"		
Vipera raddei			Antivenoms known to be effective or possibly effective for *V. albicornuta* envenomation	

Appendix A (Continued)
Antivenoms Available For Use Against Snakes of the Middle East

Snake	Known to Be Effective		Possibly Effective	
Vipera russelli	HAFF:	"Polyvalent Anti-snake Venom Serum" "*Vipera*"		
	KASA:	"Polyvalent"		
	NIH:	"Anti-snake Venom Serum", "Polyvalent" "Russell's Viper Monovalent"		
	RANG:	"Bivalent" (also known as "Divalent") "Russell's Viper"		
	THAI:	"Russell's Viper"		
Vipera ursinii	SCLA:	"Antiviperin"	Antivenoms known to be effective or possibly effective for *V. albicornuta* envenomation	
Vipera xanthina			Antivenoms known to be effective or possible effetive for *V. albicornuta* envenomation	
	IRAN:	Poly-specific		
Agkistrodon halys	CHINA:	"Monovalent Mamushi"	BAND:	Unnamed *Agkistrodon rhodostoma*
	ICH:	"Mamushi" monovalent	CHINA:	"100-Pace snake"
	IRAN:	"Mono-specific *Agkistrodon* Antivenom"	KUMA:	"Habu Antivenine"
	KITA:	"Mamushi"	TAI:	"Agkistrodon" (Partial neutralization)
	OSAK:	"Mamushi"		
	TAK:	"Mamushi"		
Agkistrodon halys	WYETH:	"Antivenin (Crotalidae) Polyvalent"	TAI:	"*Trimeresurus*"
			THAI:	"Malayan Pit Viper:"
			TWY:	"Snake Antivenom Twyford (Malayan pit viper)"
Agkistrodon himalayanus			Antivenoms known to be effective or possibly effective for *A. halys* envenomation	

Appendix A (Continued)
Antivenoms Available For Use Against Snakes of the Middle East

Snake	Known to Be Effective		Possibly Effective	
Agkistrodon intermedius			Antivenoms known to be effective or possibly effective for *A. halys* envenomation	
Bungarus caeruleus	HAFF:	"*Bungarus*" "Polyvalent Anti-snake Venom"	NIH:	"Anti-snake Venom Serum Polyvalent" "*Bungarus* Monovalent"
	KASA:	"Polyvalent"		
Naja haje	BEHR:	"Central Africa" "Near and Middle East" "North and West Africa"		
			FITZ:	Unnammed Cobra-*Bitis* polyvalent
	PAST:	"Antirept Pasteur" "*Bitis-Echis-Naja*" (if available) "Near and Middle East" (if available) "Pasteur Ipser Afrique"		
	SAIMR:	"Polyvalent"		
Naja mossambica			Antivenoms known to be effective for *N. nigricollis* envenomation	
Naja nigricollis	BEHR:	"Central Africa" "North and West Africa"		
	PAST:	"Antirept Pasteur" "*Bitis-Echis-Naja*" (if available) "Pasteur Ipser Afrique"		
	SAIMR:	"Polyvalent"		
Naja naja	BAND:	"Unnamed *Naja sputatrix* monovalent"		
	HAFF:	"*Naja*" "Polyvalent Anti-snake Venom Serum"		
	FITZ:	"Unnamed Cobra-*Bitis* polyvalent"		
	IRAN:	"Mono-specific Cobra Antivenom" Poly-specific		

Appendix A (Continued)
Antivenoms Available For Use Against Snakes of the Middle East

Snake	Known to Be Effective		Possibly Effective	
Naja naja	KASA:	"Polyvalent"		
	NIH:	"*Naja* monovalent"		
	PAST:	"Cobra" "Near and Middle East" (if available)		
	RANG:	"Bivalent" (also known as "Divalent") "Siamese Cobra"		
	SAIMR:	"Polyvalent"		
	TAI:	"*Naga*" "*Naja-Cungarus*"		
	TASH:	"Monovalent *Naja*" "Polyvalent *Naja* and *Echis*" "Polyvalent *Vipera* and *Naja*"		
	THAI:	"Cobra"		
	TWY:	"Snake Antivenom Twyford (*Naja sputatrix*)"		
Walterinnesia aegyptia	SAIMR:	"Polyvalent"		
Astrotia stokesi	Specific antivenom not available;			
	COMM:	"Sea Snake" effective in laboratory tests*		
Enhydrina shistosa	COMM:	"Sea Snake"		
Hydrophis spp.	COMM:	"Sea Snake" known to be effective for several *Hydrophis* species; may be effective for all		
Lapemis curtus			COMM:	"Sea Snake"
Pelamis platurus			COMM:	"Sea Snake"
Praescutata viperina			COMM:	"Sea Snake"

*Leftover stocks of "Tiger-sea Snake", a COMM bivalent antivenom made from the venom of *Enhydrina schistosa* in combination with the venom of *Notechis scutatus* (the "tiger snake", a land snake from Australia), but discontinued later in the 1980's, may still be available. It must not be confused with the monovalent "Tiger Snake" antivenom, also produced by COMM, which is ineffective against seasnake venoms.

Appendix B

Antivenom Producers/Distributors

Acronym Used in Text	Address
BAND	Perusahaam Negara BioFarms 9, Jalan Pasteur Bandung, Indonesia
BEHR	Behring Institut, Behingwerke AG D3550 Marburg (Lahn), Postfach 167, Germany. Telephone: (06421)39-0, Telefax: (06421)660064, Telex: 482320-02 bwd
BULG	Institute of Epidemiology and Microbiology Sofia, Bulgaria
CHINA	Shanghai Vaccine and Serum Institute 1262 Yang An Road (W) Shanghai, PRC
COMM	Commonwealth Serum Laboratories 45 Poplar Road Parkville, Victoria 3052, Australia Telegram: "SERUMS,," Melbourne Telex: AA 32789, Telephone: 387-1066
CZECH	Foreign Trade Company Limited Kodandska 46 Prague 10 Czechoslovakia
FITZ	Fitzsimons Snake Park, Box 1, Snell Park, Durban, South Africa
HAFF	Haffkine Bio-pharmaceutical Corporation Ltd. Parel, Bombay, India
ICH	Chiba Serum Institute 2-6-1 Konodai Ichikawa Chiba Prefecture, Japan
IRAN	Institut d'Etat des Serums et Vaccins Razi P.O. Box 656, Tehran, Iran
KASA	Central Research Institute Kasauli (Simla Hills), (H.P.) India
KITA	Kitasato Institute, 5-9-1 Shirokane, Minato-ku, Tokyo, Japan
KUMA	The Chemo-Sero-Therapeutic Research Institute Kumamoto 860 Kyushu, Japan
NIH	National Institute of Health Biological Production Division, Islamabad, Pakistan Telex: 5811-NAIB-PK, Telephone: 820797, 827761
OSAK	Research Institute for Microbial Diseases Osaka University 3-1 Yamadoaka, Suite 565 Osaka, Japan, Telephone: (06) 877-5121
PAST	Institut Pasteur Production, 3 Boulevard Raymond- Poincare, 92430-Marnes la Coquette, France Telephone: (1) 47.41.79.22, Telex: PASTVAC206464F
PAST-ALG	Institut Pasteur d'Algerie Docteur Laveran Algers, Algeria
RANG	Industrial and Pharmaceutical Corporation Rangoon, Burma
ROGO	Rogoff Medical Research Institute, Beillinson Medical Center Tel-Aviv, Israel
SAIMR	South African Institute for Medical Research P.O. Box 1038 Johannesburg 2000 Republic of South Africa Telegraph: "BACTERIA", Telephone: 724-1781
SCLA	Instituto Sieroterapica e Vaccinogeno Toscano "Sclavo" Via Fiorentina 1 53100 Siena, Italy

Appendix B (Continued)

Antivenom Producers/Distributors

Acronym Used in Text	Address
TAI	National Institute of Preventive Medicine 161 Kun-Yang St. Nan-Kang, Taipei, Taiwan
TAK	Takeda Chemical Industries, Ltd. Osaka, Japan
TASH	Research Institute of Vaccine and Serum Ministry of Public Health Ul. Kafanova 93 Tashkent, USSR
THAI	Red Cross Society, Queen Saovabha Memorial Institute Rama 4 Road, Bangkok, Thailand
TWY	Twyford Pharmaceutical Services Deutschland, GmbH Postfach 2108 05 D-6700 Ludwigshafen am Rhein, Germany
YUGO	Institute of Immunology, Rockefellerova 2 Zagreb, Yugoslavia

Appendix C
Selected LD50s in Humans

Species	LD50 in Humans (mg/kg x 70)	Reference
Bitis arietans	53.20*	2
	308 sc	1
Bungarus caeruleus	28	1
	5.25*	2
Cerastes cerastes	210	1
	146.25-150.00*	2
Cerastes vipera	105 sc	1
Echis carinatus	322 sc	1
	131.25*	2
Naja haje	126 sc	1
	131.25*	2
Naja naja	17.5 sc	1
	21*	2
Naja nigricollis	37.50*	2
Vipera russelli	70 sc	1
	4.50*	2

* mg/kg x 76

References:

1) *Toxicology in Pharmacology of Venoms from Poisonous Snakes* by John H. Brown.
2) "Studies of the Poisonous Snakes of Saudi Arabia" by James Vick.

Glossary

GLOSSARY

Anal plate: The large scute (scale) covering the vent. Marks the division between body and tail; may be entire, or divided by an oblique suture.

Anaphylaxis: A severe hypersensitivity reaction which may cause circulatory, respiratory, and neurological symptoms; often fatal if untreated.

Antivenin: An antitoxic serum which neutralizes a venom.

Antivenom: Antivenin.

Apical pits: Tiny depressions, usually paired, near the terminal end of each dorsal scale (when present); function unknown.

Aquatic: Living in water.

Arboreal: Living in trees or bushes.

Canaliculated: Traversed by a small tubular passage or channel (e.g. the fangs of snakes).

Canthus (or canthus rostralis): Angle between the flat crown of the head and the side, between snout and eye; may be sharp, obtuse, obsolete, or absent.

Canthal scales: Enlarged scales along lateral border of crown between internasals and supraoculars in some vipers and pit vipers.

Centimeter (cm): Unit of measure equal to 0.01 meter (0.3937 inch).

Chin shields (Genials): Paired enlarged scales near ventral midline of lower jaw; anterior chin shields in contact with mental, or separated from it by first infralabials; a pair of posterior chin shields may be present behind the anterior.

Compressed: Flattened side to side, height greater than breadth.

Constriction Band: Wide piece of rubber or other material used to depress flow along superficial lymphatic and venous channels.

Crotalid(s): Snakes of the family Crotalidae (pit vipers), includes the rattlesnakes and lance-heads.

Crown: Top of head, or anterior part of top; usually occupied by nine enlarged scutes, from the rostral (on the snout) to the parietals.

Cyanosis: Bluish discoloration of the skin caused by insufficient oxygenation of the blood.

Depressed: Flattened top to bottom, breadth greater than height.

Distal: Farther away from body (compare proximal).

Diurnal: Active during daylight hours (compare nocturnal).

Dorsals: Rows of small scales covering top (dorsal) surface of snake's body. They are counted in a diagonal (or zigzag) line from the edge of the ventral plate, across the back to the opposite edge.

Ecchymosis: Discoloration of skin resembling a bruise; caused by extravasation of blood.

Edema: Presence of excessive fluid in intercellular tissue spaces.

Elapid(s): Snakes of the family Elapidae; includes cobras, kraits, coral snakes, mambas.

Envenomation: Deposition of venom within tissues.

Extravasation: Passing of a body fluid out of its normal place (e.g. blood into surrounding tissues after rupture of a vessel).

Eye (Sizes): Moderate size eye: diameter about equal to eye's distance from lip; large size eye: diameter about one-half distance from lip.

Fangs: Enlarged hollow or grooved teeth specialized for injection of venom.

Fasciotomy: Incision cutting fascia or dense connective tissue surrounding muscles. Sometimes used in treatment of snakebite to release pressure from severe swelling.

Frontal: Single enlarged median scute on crown between supraoculars and behind prefrontals.

Gulars: Rows of small, nonspecialized scales on ventral surface of lower jaw anterior to ventral plates.

Hemoglobinuria: Presence of hemoglobin in urine.

Hemotoxin: A toxin capable of destroying blood cells. Often also applied to toxins that cause hemorrhage.

Herpetology: The scientific study of reptiles and amphibians.

Hypotension: Abnormally low blood pressure.

Imbricate: Overlapping, like roof tiles; the usual condition for dorsal and ventral scales (compare juxtaposed).

Infralabials: Scales (usually enlarged) along border of lower lip behind mental.

Internasal(s): Scutes (usually paired) on crown just behind rostral.

Intraperitoneal: Within the peritoneum, or peritoneal cavity.

Juxtaposed: Edges adjacent but not overlapping; the usual condition of head shields (compare imbricate).

Loreal: Scale on side of head lying between the (nasal or postnasal) nasal and the preocular(s); characteristically absent in elapid snakes.

Lyophilization: Process of quick freezing and dehydration under high vacuum.

Mental: Triangular scale at symphysis of lower jaw, corresponding in position to rostral of upper jaw.

Meter (m): Unit of measure equal to 3.2808 feet.

Millimeter (mm): Unit of measure equal to 0.001 meter (0.0394 inch).

Myoglobinuria: Presence of a type of muscle protein in urine.

Nasal: Scale enclosing nostril; may be single, partially divided by a suture extending down from nostril, or completely divided (giving a pre- and postnasal) by a vertical suture that extends through the nostril.

Nasal valve: A sphincter device for closing nostrils; found in some vipers, nearly all sea snakes.

Nasorostral (scale): An enlarged scale (usually paired) that lies just behind the rostral scale (e.g., between the rostral and the nasal) in some vipers.

Necrosis: Death of a circumscribed portion of tissue.

Neuromusclar transmission: The relay of a stimulus from the end of a nerve to its muscle.

Neurotoxin: A poison having more marked effect on nerve tissue than on other body tissues. Often improperly used to denote that the poison affects only the nerves system.

Neutralize: The ability of a substance (antivenom) to nullify the effects of another substance (venom).

Nocturnal: Active during night (compare diurnal).

Occipitals: Paired enlarged scutes that lie immediately behind the parietals in a few snakes (e.g. king cobra).

Paresis: Slight or incomplete paralysis, sometimes noted as weakness of a muscle.

Paresthesia: An abnormal sensation, as pricking, numbness, burning.

Parietals: Large paired scutes at rear end of crown, immediately behind frontal and supraoculars.

Petechiae: Small spots formed by effusion of blood.

Pit (loreal pit): Deep depressions on sides of head in loreal region of pit vipers (family Crotalidae); are heat-sensitive, aid snake in finding prey in dark.

Plate: A large flat scale, usually on head or ventral surface.

Polyvalent: An antivenom containing antitoxins against the venoms of a number of different snakes.

Postoculars: Scale(s) immediately behind, and in contact with, the eye; usually between the supralabials and supraoculars.

Prefontal(s): Enlarged (usually paired) scutes just behind internasals, (or that area if it is covered with small scales).

Prehensile (in reference to tail): Adapted for grasping by wrapping around; usually visible as a curled, compressed tail tip. Typical of tree snakes.

Preoculars: Scale(s) lying immediately in front of an in contact with eye.

Proteolytic: Capable of causing the digestion or dissolution of proteins.

Proximal: Nearest to main part of body, or median line of body (compare distal).

Ptosis: Drooping of upper eyelid.

Pupil (or eye): Black opening enclosed by iris; may be round, horizontally elliptical, or vertically elliptical.

Rostral: Single enlarged plate at tip of snout.

Savannah: Grassland characterized by scattered trees or bushes.

Scutes: Overlapping or juxtaposed scales that cover the body surface.

Shield: An enlarged scale or scute, commonly specialized and given a distinctive name.

Shock position: Victim lying on back with head and chest slightly lower than feet.

Snakebite: Bite inflected by either a venomous or nonvenomous snake.

Snake venom poisoning: A condition resulting from the injection of snake venom.

Subcaudals: Scales or scutes under tail; may extend across entire ventral surface (single), or go only half way across, where they are met by another scale (paired).

Suboculars: Scale(s) immediately below and in contact with the eye; between the eye and the supralabials.

Subterranean: Living under surface of ground (compare terrestrial).

Supra-anal tubercles: Small, raised, keel-like structures on dorsal scales above vent in some snakes.

Supralabials: Scales (usually enlarged) or scutes along border of upper lip behind the rostral.

Supraoculars: Enlarged scales or scutes (sometimes divided) on crown directly above each eye.

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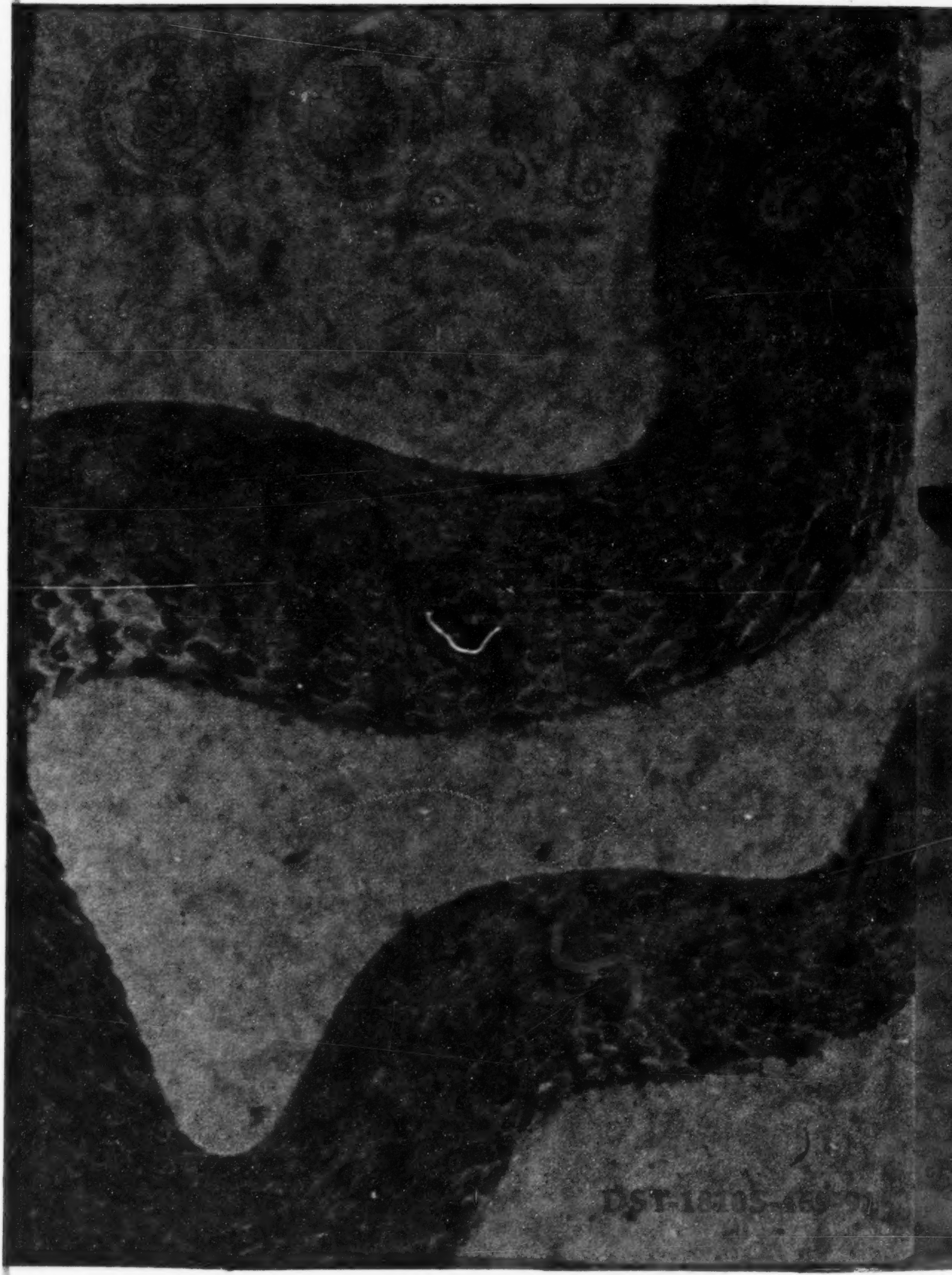

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